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ADVANTAGES OF TRIFOCAL LENSES AND REASONS WHY THEY SHOULD BE WORN.

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GENEVA, N. Y.

Those who have lost their accommodation often need to see clearly at distances intermediate between the reading point and infinity. Many who have not felt this need very much would find distinct intermediate vision very convenient. Trifocal glasses have been found practicable. The problems presented in connection with them have been studied and satisfactory solutions for them are here indicated. A better understanding of the subject will lead to the more general use of such lenses. Read before the Staff of the Geneva, N. Y. City Hospital, Oct. 4, 1920.

In this age men of letters and science, laboratory workers, students, watch makers, die makers, merchants and others want better vision. They demand seeing objects in detail. They demand perfect definition or resolving power at the various distances at which they work. Consequently, what they cannot see with their eyes must be seen thru lenses. What cannot be done with their accommodation must be done mechanically with the convex lens. A student's readiness to learn depends upon his ability to see in detail and to visualize mentally from spoken and written text. All learning is mentally recorded in picture form, visualized facts. Young artisans are constantly visualizing facts. With long experience they become valuable assets to the community. When they reach middle life and become most skillful and proficient in their vocations, these men should be at their best. At this very time accommodation disturbances are prone to begin and the worker suffers from defective vision and becomes a problem for the eye specialist. Lenses must replace mechanically what was lost physiologically. If lenses can be made to give fairly perfect definition of vision at all distances then we can place these patients, in their various vocations, in a class with the young men, with a constantly increasing efficiency, instead of among the aged with a decreasing efficiency. This old men's class will not be thrown out of offices, factories, shops, etc., at fifty-five or sixty years of age because they cannot produce in competition with the younger men. They will become more valuable because of their longer experience. They will not become dependents upon their relatives, friends or the community, but instead will be of great economic value to the state. All men must see well to attain their greatest efficiency. Therefore, when production is increased, men will be better paid, investors will get better dividends, merchandise can be sold more cheaply by the manufacturer both to workman and public alike.

Robert Hooke, in 1674, in dealing with the power of the human eye to distinguish double stars and to see two points, or two details of an object as two, concluded that the two stars or two points of any object must be at least far enough apart to make the visual angle one minute of arc. A few people can distinguish double stars with a visual angle of less than one minute, but for many people the visual angle must be greater. If the visual angle is too small, then the two stars or the two points appear to fuse and form one. The visual angle of one minute then does not represent the limit of *visibility*, but the limit of *resolution*, that is, seeing two objects as two separate things. Now as the visual angle under which any given object is seen

depends upon its distance from the eye, and the power of accommodation, for the distance in the eye is limited, and this power decreases with age, if very small objects are to be seen, or the parts of larger objects are to be distinguished as separate details, there must be some means of enabling the eye to get very close to the object. The convex lens serves to increase the visual angle under which an object is seen, thus virtually making it possible to get the eye very close to the object, and still retain the sharpness of the retinal image. Or, to put it another way, the convex lens helps the eye to produce a larger retinal image and makes the details large enough to fall upon more than one of the retinal elements, thus making resolution possible. One other thing must not be forgotten. The intensity of the light on an object varies inversely as the square of the distance. Consequently a lens that brings the object nearer one-half the distance, increases the intensity of the light on that object four times, which very materially assists in making resolution possible.

One of the main causes why the civilization of the world was so slow in advancing is the fact that men could not use their eyes much for close work after middle life, on account of their old eyesight or presbyopia. This was the case in Benjamin Franklin's day. The single lens seemed to be the one worn if any at all. He could see that before long it would not be possible for him to do his daily work with his distance lenses only. He realized that his *old sight* was coming. This fact would require stronger lenses for close work. He also found out that it was a constant nuisance to be compelled to keep changing glasses. Franklin's inventive mind conceived the idea of bisecting one reading and one distant lens, grinding the two halves into one frame, the weaker half for the upper or disance, the stronger half below for close work. With this invention he lengthened his years of usefulness. From his time on the bifocal lens became increasingly popular, and many new inventions came out, until today we have a great many varieties of bifocal lenses. The bifocal lens has had its day. We are now in a new era. In order to meet the exacting demands of present day civilization we must advance and that advance in refraction work means the trifocal or multifocal age. Thousands are wearing bifocals and are well satisfied. But many are limited in their vocations by their use. Others are dissatisfied with their inability to distinguish details. They are unable to wear their bifocals at all. This necessitates the constant changing of glasses for their various working distances.

Accommodation may be defined as the power of the eye to focus rays of light upon its retina for different distances at different times. In other words, the eye cannot focus rays of light upon its retina from different distances at one and the same time. For example, the point of a pencil held six inches in front of the eye is not seen clearly (is hazy) as the eye looks at the printed page fifteen inches beyond: and, *vice versa*, the printed page is not seen distinctly if the point of the pencil is looked at. In the study of the normal emmetropic eye, it has been found that the amplitude, or range, or power of accommodation gradually diminishes from youth to old age and thus becomes very apparent at about forty-five years of age. This is the result of one or more changes: the crystalline lens fibers lose their elasticity, becoming more sclerosed, or the ciliary muscle grows weak, or both of these changes exist together. Amplitude of accommodation may then be defined as the difference between the refraction of the eye in a state of rest (or adapted for its far point) and in a condition of maximum refraction, or adapted for its near point. A knowledge of the power of accommodation is absolutely essential, so that any variation from the standard may be noted. The following table gives some of the ages from ten to seventy-five years, respectively, the near point consistent with each, also the amplitude of accommodation for each period.

Years.	Near Point.	Amplitude In Diopters.
10	7 cm.	14
20	10 "	10
30	14 "	7
40	22 "	4.50
45	28 "	3.50
50	40 "	2.50
60	100 "	1.00
75	Infinity	0

This table of near points applies only to emmetropic eyes or those eyes which are made emmetropic by the adjustment of suitable correcting lenses. The table of amplitudes, however, is the same, with few exceptions, for all eyes of whatever degree or amount of amblyopia.

In refraction work there are principally two classes of eye troubles: hyperopes and myopes, the former by far in the larger majority. Let us analyze what takes place by the following table, which gives the comparative near points, in centimeters, in an emmetropic eye, a hyperopic eye of two diopters and a myopic eye of two diopters.

Age—	10	20	30	40	45	50	55	60	75
Emmetropia nearpoint	7.	10	14	22	28	40	55	100	Inf.
2 D Hyperopia nearpoint...	8.3	12.5	20	40	66	200	Inf.	..	..
2 D Myopia nearpoint.....	6.	8.3	11	15.3	18	22	25	33	50

It is easily seen from the above table that an emmetrope at seventy-five years of age has lost his power of accommodation entirely, while a two diopter hyperope has lost his entirely at fifty-five years of age. The greater the degree of hyperopia the earlier is the power of accommodation lost. This lost power requires visual assistance and especially is this true when we reach the age of fifty or sixty years or thereabouts. We are able to give perfect corrections for distance. We are also able to correct perfectly for close work of ten, twelve, sixteen or twenty inches. With a sixteen inch correction one can read a magazine or newspaper perfectly at sixteen inches, but we find as we push the magazine away to twenty or twenty-five inches, there is a decided loss in definition. The letters, at first sharply defined, become gray and more indistinct as they are moved away, until they finally disappear. In early middle life this condition is not so. But what can we do to regain this lost area of vision? One prominent surgeon called it his "No man's land." Our distant correction will not take care of it. If we correct closely for reading there is a space of twenty or thirty inches where it is impossible to have good definition with the customary presbyopic correction. The patient must either move toward the object to the limit of his corrected distance, in order to bring out the fine detail, or he must bring the object up to him to the same limits. Many times this is impossible, as for instance with surgeons, machinists, pressmen, linotype men, students in libraries reading titles of books on shelves, merchants looking at the price marks of goods on shelves, automobile mechanics making fine adjustments in almost inaccessible parts of engines, etc. One other thing that he can do, he may go without seeing in detail, he may just have *visibility* without *resolution*. That is what many do.

About five years ago I discovered that I had great difficulty in seeing the sharp edges of the shadows as they crossed the pupils of patients' eyes in my shadow tests, working at twenty-six to forty inches while using bifocals. I also noticed in my nose and throat work that I could no longer see detail unless I put on a special correction for thirty inches. I could see well for the special distances for which I was corrected, altho my resolving power in both eyes is 190% with Ives' visual acuity test; but the necessity for constantly changing glasses was so great an annoyance that I began to cast about for some relief.

Out of my dissatisfaction sprang the idea of making a lens consisting of three parts, with a distant vision lens, an intermediate lens and a close vision lens, all in one. A *trifocal* lens. I made what I thought would answer my purpose. I tried in vain to wear this trifocal lens for one month and it

nearly drove me to distraction. Upon investigation I thought that I had discovered the reason for my inability to wear trifocals and experimented with another pair which proved much better, but still were not comfortable. I continued to experiment with a number of lenses in cemented form, in solid form and in Kryptok form until I overcame the difficulties, and now I find that my *trifocals* are satisfactory for all distances for which I care to work. It now seems impossible to use bifocals at all. Having found so great a pleasure in the use of my own trifocals, I began prescribing trifocals to surgeons who demanded that I give them a correction to see in detail from twelve to thirty inches, in addition to their distant lenses such as I was wearing myself. Then followed physicians, bookkeepers, bankers, machinists, die makers, etc. My conclusion is that trifocals, with all their added advantages, when properly corrected and made, can be worn with greater ease and comfort than bifocals. Any multifocal lenses, the individual foci of which are not perfect corrections for the several distances for which they are made, will be failures. The writer has one patient, a die maker, who is corrected at ten inches, sixteen inches, thirty-two inches and infinity in one combination.

My method of procedure is as follows: After correcting my patient for his distant vision, I find the near point at which he can read the average magazine print or Jaeger's number 8, in a good light. This will average between thirty-six to forty-five inches. Next I correct his presbyopia over his distant correction, for whatever distance he desires for near work, usually about fifteen inches. After which I find his range of accommodation, far point and near point with this correction, on Jaeger's number 8. For 15 inches, or +2.50 diopter, it will be between twelve and twenty inches, depending upon the case. For the intermediate correction I select such plus lens added over the distant correction which far point will overlap eight to twelve inches the near point of the distant correction in each eye, using Jaeger's number 8. Next I try this newly selected intermediate correction to see if its near point will overlap, four or five inches, the far point of the full presbyopic correction, using Jaeger's number 8, in good light. This intermediate addition is usually about one-half the added presbyopic correction.

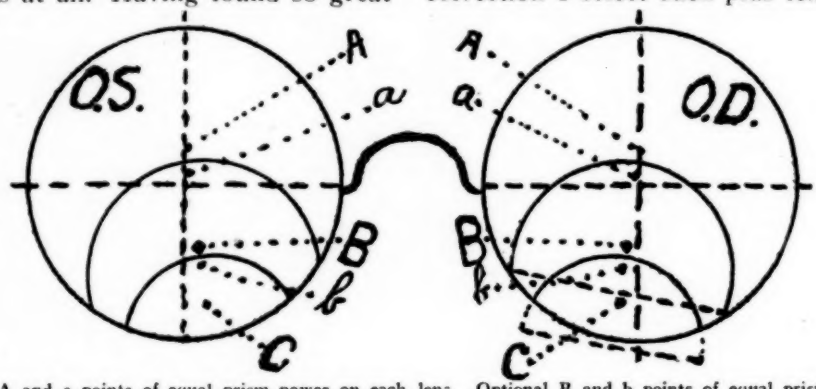

Fig. 1.—A and a points of equal prism power on each lens. Optional B and b points of equal prism power. B B and C C are distances between centers of area of the intermediate and reading wafers, and are respectively 3 mm. and 6 mm. less than the pupillary distance.

The object is to select such an addition for the intermediate correction as will give an equal vision, for eight to twelve inches, on its far point as is given by the eight to twelve inches of the near point of the distant vision correction, using the same test type. In other words, for a space of eight to twelve inches the same test type is read equally well by both the distant and the intermediate corrections. If the proper intermediate addition has been given there will be at least five

inches between the intermediate and close vision corrections where, with the same test type, it can be read equally well with either correction. I add to or deduct from the intermediate correction so that these overlapping areas will be rightly proportioned.

The fitting of the frame is an important matter. I use a Bausch and Lomb Interpupillary Distance Gauge, which will give give the correct interpupillary distances for distant, intermediate, and close visions. It will show if the crest of the nose is midway between the pupils. If asymmetry exists, I make the proper nose piece and temple adjustments. I adjust the frame so that in looking in the distance the pupils are 3 mm. above line. I have the plane of the frame about 14 mm. from the cornea. I use the largest round lenses possible that will give the correct interpupillary distance. I use riding bows of the proper style and length.

I have obtained the best results from cemented trifocals by using a 30 mm. round, thin wafer, ground with proper corresponding curves to match the inside of the distant lenses. The wafer should be of such a strength, that, when added to the distant correction, it will give the intermediate correction. I have other thin wafers ground 24 mm. round, distal curve corresponding to the proximal curve of the intermediate wafer. The strength should be the presbyopic addition, less the intermediate correction. It must be remembered that the intermediate wafer gives part of the presbyopic addition.

These wafers, when cemented in place, should be of circular form, with the lower segment of the circle cut off so that the optical axis of each eye, with its up and down and side movements, will shift on and off the edges of the corresponding wafers at precisely the same time. This is very important. Trifocals are very annoying and frequently intolerable when at

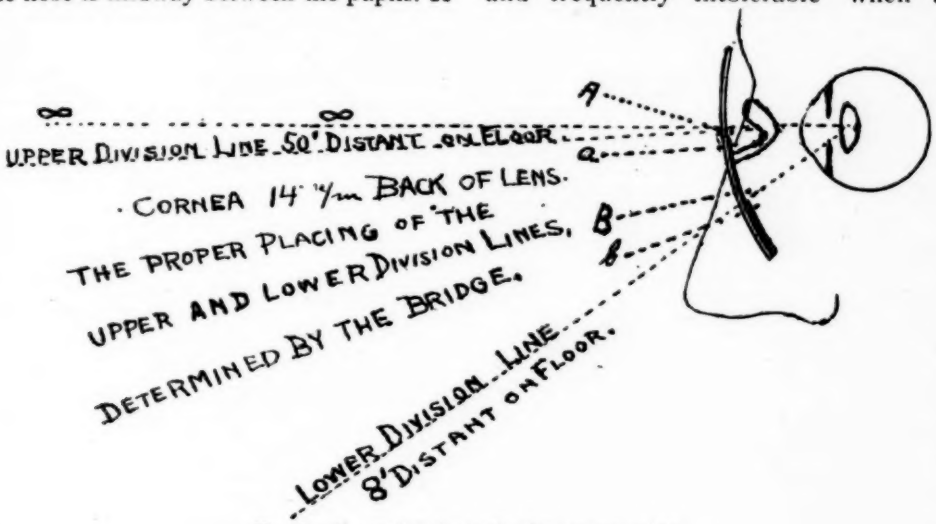

Fig. 2.—A a and B b equal prism power points

times one eye is looking thru the intermediate correction and the other thru the distant, or when one eye is looking thru the close vision and the other thru the intermediate. In cutting distant meniscus or toric lenses it is necessary to decenter the plus lenses up, and the minus lenses down, sufficiently to avoid, as nearly as possible, the prismatic aberration, when the eye changes from the distant vision to the intermediate. If it is preferred this prism correction may be put in the wafers. The purpose is to obviate the apparent jump of the object seen, as nearly as possible, when changing foci. However, this jump or prismatic aberration between the intermediate and close vision wafer does not annoy very much because objects seen are closer by.

I am fortunate enough to possess an

Allen Foci-Prisometer made by the George S. Johnson Optical Company, Chicago, Illinois, on which I have placed an automatic centering and axis marking device. This instrument makes the decentering and proper placing of trifocal wafers on the distant vision lenses a matter of mechanics, instead of mathematics. The lensometer, made by the American Optical Company, Southbridge, Masssachusetts, or the Axis Marking and Lens Centering Machine, made by the Standard Optical Company, Geneva, New York, are helpful accessories used in the making and checking up of trifocals.

Before cementing on the wafers, I place them, or a thin brass templet, shaped like the wafers, on the distant lenses. I place them in the exact position, proper height and decentering they are to be. I hold them in position with a small wire paper clip, then with a glass marking pencil, I outline the edges of the wafers on the front surface of the far-seeing lenses. These markings serve as a guide to correctly place the wafers, after cementing just before cooling. Having determined the proper shape of the wafers, I thoroly clean the cementing surfaces of the lenses and wafers, being careful not to erase the position marks. I then place the wafers in their respective positions on the distant lenses, with Canada balsam placed between the cementing surfaces. Having done this, I place lenses and wafers on the low heat of an electric hot plate and cook slowly for a long time, one-half hour or more, depending on the amount of heat. Very little experience will teach one how long to cook them. After turning off the heat, I decenter the intermediate wafers 2 or 3 mm. in, top edge 3 mm. above line, and the close vision wafers each about 3 mm. in, with the width of the wafer about 11 mm. up and down. The position marks should correspond.

I allow them to cool slowly, and when cool I clean off any excess of balsam, after which I seal the undercut edge of the wafers with a clear shellac cement made 60% of 95% alcohol and 40% bleached dry shellac. (In making this solution allow it to stand for severals days, shaking occasionally. When a clear stratum of liquid appears I filter this clear liquid thru filter paper and add 2% castor oil to render it less brittle. Let it evaporate and use when about the consistency of thin syrup.)

After applying to the edge of wafers, dry with a gentle heat. If this is properly done there will be little or no excess to clean off with alcohol and the wafers will not come off until they are taken off. I direct my patients in the future cleaning of these lenses to dampen a clean cloth with a 5% ammonia solution and wipe clean. The chemistry is grease, plus ammonia, which forms soft soap and glycerin, a splendid cleaner. A horizontal turn table 80 or 90 mm. in diameter, marked on its surface with concentric circles, on which are two spring clips for holding the lens in position, is also of valuable assistance in sealing the edges of wafers.

The natural standing position of the patient should determine the height of the wafers. Standing at ease naturally, the line between the distant and the intermediate vision should be fifty feet away on the level floor. The slight floor blur of the intermediates inside of this distance does not annoy the patient very much, because if he wants to see anything more in detail within that distance, he may do so by slightly dropping his head and using his distant vision lenses. The intermediate and close vision division line should be seven or eight feet on the floor in front of the patient when standing erect and at ease. Eye specialists will be surprised how well these trifocal patients get along with this 11 mm. wide lower or reading wafer. Nearly all of their near work is done thru the intermediates.

The writer does not claim that every presbyope should have a pair of trifocal spectacles. There naturally are many impossible cases, and many that do not need them. To my colleagues who wish to try prescribing of trifocals, I would say, be very careful in selecting your cases, especially at first, and work in conjunction with your manufacturing optician and you will be happily surprised with your results in the new field.

THE NATURE AND TREATMENT OF STRABISMUS.

DR. CHARLES DELOGÉ,

NICE, FRANCE.

Starting from Parinaud's conception of the nature of strabismus and the facts brought out by use of the diploscope the writer traces the double origin (nervous and optical) of strabismus. Educational treatment is indispensable, but must often succeed surgical intervention. The importance of the exhaustive study of each case is insisted on.

Oculists do not seem likely to agree among themselves on the nature and treatment of strabismus, despite the numerous treatises, some of quite recent date, which have appeared. The most varying opinions have been held and still find their convinced and authoritative defenders. The affection was, for some time, believed to be of muscular origin, thereby confounding it with deviation or squinting, which is an important symptom, but neither characteristic or always noticeable. Donders evolved really scientific explanations, and tho their value must not be exaggerated, it is certain that they are one of the greatest steps towards progress which has been accomplished. Javal, in turn, devoted a highly interesting volume of minute observations and documents to the theme.

Parinaud finally enlarged on the conceptions of his predecessors, and decided that strabismus was a faulty development in the apparatus of binocular sight. His opinion has become classic, and his masterly ideas have been exploited in the interesting work of Sauvineau. The given theory of a complaint has not alone an historical interest. It is generally admitted that any belief, be it true or false, gives rise almost always to appropriate actions. That is the case with strabismus, the treatment of which, after an entirely medical period, has become almost exclusively surgical; it has now entered a medicosurgical phase.

The subject has been treated so fully and repeatedly by so many eminent men that it may be pretentious in a newcomer to risk a few criticisms. Our excuse is, that in coming after them, we have profited by the ingenious apparatus our illustrious predecessors lacked. The ideas which we in turn, express are the result of numerous observations made either in hospital or among our patients. We have been helped in the long and difficult work by the valuable counsel of Professor Lapersonne, our tutor, and the frequently recalled advice of Dr. Rémy, the inventor of the diploscope.

Dr. Rémy[1] made his first experiments in the year 1901; since then some modifications of detail have been added to the diploscope, by several oculists and by himself; but these modifications have not altered the first conception, and the ingenious apparatus remains practically the same. The diploscope essentially consists in a large tube, closed behind by a plate moving on its own axis. This plate is pierced by four separate holes, one at 4, the others at 6 centimeters. Two openings only are visible at the same time, owing to the action of the operculum. The apparatus is placed horizontally on a stem of 1.25 m., ending at one end with a chin support, or two eye holes, and at the other with printed letters, of which the number varies, according to the nature of the experiment, between 2, 3 or 4. The rotation of the plate allows the numbers to be seen horizontally or vertically. Dr. Rémy has also constructed a smaller diploscope, differing from the preceding model, by its lesser length and the absence of the tube. The following illustrations will, we think, facilitate the comprehension of the simple technic of the apparatus.

The slightest alterations in binocular sight are immediately recognized by the displacement of the letters, which no longer appear in their normal place, but in crossed diplopia if there be divergent strabismus, or in homonymous diplopia, if the strabismus be convergent.

We shall not dwell upon the great developments of Parinaud's[2] theory,

only we must insist on the fact that according to this author, strabismus is always an affection of childhood. In any case, his definition is extremely explicit. It is a question of "a flaw in the development of the apparatus of binocular sight, preventing the convergence of the eyes upon a fixed object." It is a disorder of central control in the reflex of the convergence. If this last be exaggerated, there is convergent strabismus; if it be lessened, divergent strabismus supervenes. The cerebral trouble itself may be primitive, and may, by that fact, prevent binocular sight, or it may supervene early and impede normal development. (Parinaud, pp. 19, 48, 50, 98, 115, 124.) M. Sauvineau,[3] in adopting this idea, wishes to localize the cerebral trouble more precisely still, to the center of the convergence (Sauvineau, loc. cit., p. 146).

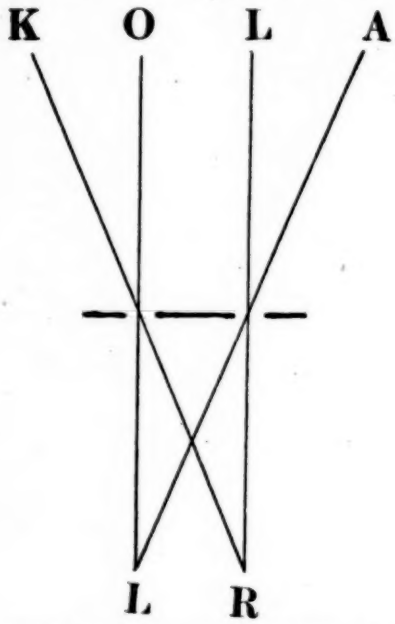

Fig. 1.—The four-letter experiment for normal eyes. R. and L. are seen by the right eye. O. and A. by the left eye. The two openings furthest apart are placed horizontally for this experiment.

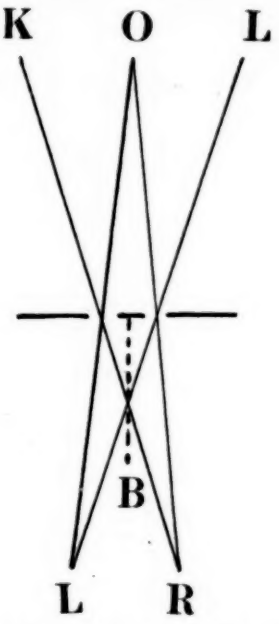

Fig. 2.—Three-letter experiment for normal eyes. K. and O. are seen by the right eye. O. and L. are seen by the left eye. If the bar placed vertically in front of the tube is lowered, O. alone continues to be seen by both eyes, K. and L. having their rays intercepted. The two nearer openings are placed horizontally for this experiment.

Thus strabismus, which was according to savants a local affection of visual or muscular origin, became, according to Parinaud, an affection of the central control. The superiority of this conception over its often inadequate precedents cannot be ignored. It appears to be not only the most natural but the only probable explanation of certain forms of strabismus, more particularly those which supervene when optical causes are at fault. Two children possess the same refraction, the same visual acuteness, one has a direct gaze and normal binocular sight, while the other is strabismic. There must be a cause for the latter condition, and since it does not exist in the eyes, it must be sought elsewhere, that is, in the brain. Strabismus is, so to speak, the sign of organic decadence, a stigmata of degeneration.

The important part played by all sorts of infectious maladies, measles, scarlatina, typhoid fever, in the case of the child, is thus wonderfully explained. Convulsions, it is well known, are frequent in the previous life of the little strabismic. Professor Fournier and Dr. Antonelli have, on their side, pointed out, perhaps rather immoder-

ately, the importance of syphilis in the progenitors; also, there is the question of consanguineous marriage, or of alcoholism. To sum up, it seemed probable that all causes capable of bringing nervous troubles, could in a certain measure disorder the delicate machinery of binocular sight.

The nervous theory of Parinaud would, if necessary, serve a clinical argument. Strabismic children are often not only irritable and nervous subjects and actual neuropaths, but strabismus itself presents at times considerable individual differences. All those who have treated children know that tho strabismus may rapidly improve under the influence of glasses and atropin, there are unhappily fairly numerous cases where the best informed usual therapeutics show themselves particularly inefficacious, whether they be applied to the generally convergent form of the strabismus itself, or to the preexistent nervous cause.

But if Parinaud's theory throws a new light on cases of strabismus that supervene where the child's eyesight is almost normal, it becomes less necessary, tho still very useful, in explaining the form of strabismus that Donders has attached to refraction troubles, and principally to the discord they establish between accommodation and convergence. In fact, the greater part of these strabismics generally give way fairly quickly to suitable optical treatment. Consequently, it becomes difficult to determine the part of ametropia and that of the nervous system, in the evolution of the ocular affection. The interpretation may become singularly embarrassing, and a minute examination of the subject and its antecedents will be found necessary to specify the etiology.

Regarding strabismus in the adult, Drs. Parinaud and Sauvineau are most discreet. If they speak of it, they call it an old strabismus, or explain it by a nervous anterior predisposition. Our intention is to show precisely that this affection can supervene among individuals whose binocular sight is perfectly developed, and without necessarily being connected with special nervous influences. This variety of strabismus is a particularly interesting study, because it is peculiar to adults, and its evolution can, so to speak, be easily followed from day to day. But, before we go into the numerous points which form the basis of this study, it would not be uninteresting to come to terms with strabismus itself.

Strabismus must not be identified with deviation, which may not be present in strabismus, but may appear in totally different disorders such as paralysis, or tumors of the orbit. Comitant strabismus is essentially a disease of binocular sight, preventing the convergence of the eyes upon a fixed object. The visual trouble varies according to the evolution of the strabismus.

Normal binocular sight is first attacked by simultaneous vision, in which both eyes, tho one is often weakened, preserve their visual powers. Thence the patient experiences more or less marked inconvenience, rather indefinite and generally of short duration, during which deviation is rarely apparent.

This period is soon succeeded by partial simultaneous sight (simultaneous sight of Parinaud) which we have elsewhere called panoramic vision. Parinaud has defined it very well in further naming it alternating central vision. Neutralization (suppression, inhibition) is the most typical and curious characteristic of this period. However, as neutralization has its adversaries, it is necessary to agree upon it. Parinaud, in his treatise, says of it, "The physiologist looks upon it as a word without significance," (p. 96) and since then the criticism, given in superb style, has enjoyed extraordinary popularity. Indeed, one must not be led away by words, since, whatever the cause, neutralization is distinctly one of the most clearly proved facts, not only with regard to sight, but to the other senses. The more the latter become complex, the more they teach us, and the more they neutralize. As a principal effect, the attention we bring to bear on a subject lifts it from its frame and separates it from surrounding con-

tingencies. In a word neutralization is not a particular act of the sight, but a general phenomenon, as necessary to our intellectual activity as the shades are to the lights of a picture. This is so true that in some nervous pathologic conditions fatigue will be enough to lessen this faculty and bring about different and trying disturbances. We ourselves have come across many strabismic patients who suffered almost continually from diplopia.

In panoramic sight, neutralization is the reaction of the defense against diplopia, and the more rapidly it intervenes, the less the subject suffers from the preceding period. This neutralization is elective and keeps exclusively to that portion of the retina corresponding to the object seen by the non-deviating eye, and avoiding the other regions of the visual field. For this reason we have called this form of sight panoramic. The diploscope makes the study of neutralization an easy matter, and by the judicious use of this instrument, it can often be made to appear and disappear at will. At any rate, alternate is the opposite of simultaneous and nothing is more certain than alternating central sight, if it be not alternating central neutralization. There has been a mere wordy quarrel concerning it, and we hold, nevertheless, to the neutralization admitted by Graefe and Javal as a characteristic and indisputable fact.

Neutralization does not always conduct itself along the same lines. It is alternating and generally remains so, when both eyes are of equal strength; or when one is far-sighted and the other near-sighted.

But at times, without appreciable cause, or with more reason, where one of the two eyes is manifestly inferior to the other, neutralization becomes fixed; and alternatively the sight becomes monocular. This new stage is the graver on account of the momentous disorders it brings about. One of the most embarrassing of these accidents is amblyopia ex anopsia, so called because it is not accompanied by any appreciable alteration, sufficient to explain it. It is frequent and often considerable in the case of a child attacked by convergent strabismus. It is much less marked in cases of myopia, or, when an adult is attacked by divergent myopic strabismus. Even when of long duration, the functional diminution of sight rarely exceeds a few tenths. An exact optical correction and a few exercises will, in this case, generally suffice to bring about a rapid and complete restoration of the sight.

Simultaneous vision, alternating central or panoramic vision, monocular sight, these are the stepping stones, the successive and characteristic stages of strabismus. In the course of this affection, amblyopia and deviation itself, are but frequent and simple, tho often very annoying accidents.

Strabismus, thus understood, may make is appearance in an adult endowed with a perfectly developed apparatus of binocular sight. This certainty, with us, is the result of numerous minute and most affirmative observations. If the contrary idea has been overvalued or overpraised, it is certainly due to the difficulty of examination, and the imperfection of the apparatus employed. Rémy's diploscopes[4] have allowed us to follow the evolution of strabismus, in a large number of patients of varying ages. For the sake of precision, we will give a summary of some of these cases further on.

An appreciable difference in the sight of the eyes is the usual cause of strabismus in the adult. Hering compares the optical apparatus to "a double team driven by single reins." We will use his ingenious idea. If one of the team goes lame, it either stumbles on with difficulty or stops and must be detached. It is the same case with the sight. The causes of strabismus in the adult, are then very varied. A unilateral and rather tardy myopia, a traumatic cataract, monocular aphakia and, lastly, to generalize, any accident which brings about an appreciable difference in the sight of the eyes, enter into the question. We have recounted thirty cases of anisometropia, chosen from many others, in our inaugural treatise. Each time the difference of refraction exceeded two di-

opters, a visual alteration, an actual strabismus existed before correction. Dr. Sauvineau, who cites this fact, adds however, further on, that he has not much belief in the influence of anisometropia as an essential factor of strabismus. We reply to this that if among the patients examined, a certain number were attacked by anisometropia in childhood, others were numerous, who did not suffer until adult age; when, so to speak, the development of the apparatus of binocular sight was perfect.

Thus, strabismus is infinitely more frequent than is generally believed, and a methodical examination, with the diploscope, of persons afflicted with defective sight gives adequate conviction. The numerous researches we have made, since our treatise, confirm this view.

It would be no doubt exaggeration to say strabismus presents special characteristics, which distinguish it from previously described forms. Tho lacking in very marked differences, strabismus is, however, accompanied by slightly peculiar symptoms. The onset of strabismus in the adult as in the child, is slow and progressive, and of insidious growth. Also, apart from the more or less acute sight troubles, usually attributed to fatigue, the patient rarely complains. Deviation is more interesting. At times, it is very marked, but more often it remains trifling and it is chiefly in such cases that invisible strabismus (heterophoria) is frequent. On interrogation, however one often learns that a certain amount of deviation in the vague gaze, has sometimes been noticed. Stereoscopic vision may exist and the diploscope is almost indispensable to make the alterations in binocular vision manifest. Let us also remark that large as well as small diploscopes are necessary, for the sight may act differently near to, or at a distance. Deviation, apparent or not, is nearly always produced from outside, and divergent strabismus is much more frequent.

Amplyopia ex anopsia is less pronounced. It has surprised us more than once to find patients, who had suffered from unilateral myopia for twenty years and who, even in reading use their emmetropic eye, obtain almost immediately, excellent sight with their correction. In short, this strabismus is more frequently seen among perfectly balanced and healthy individuals, with whom the affection is ocular, and purely accidental.

We will point out later, in speaking of treatment, the very great curability of this form of strabismus. We will now cite, as briefly as possible, the following cases:

Case I. The patient was a boy of 14 years of age, whose left eye had become myopic following keratitis. We saw him for the first time at the Hotel-Dieu, on the 15th of May, 1905. According to the skiascope, M. Me. . . is emmetropic in the right eye and myopic in the left 4.50 D.

Vision R. = 0.9. In L. = 0.1, after correction 0.9.

We examined him diploscopically. His sight, without correction is alternative, and his myopic eye serves for nearer sight. After correction, neutralization persisted for a time, then simultaneous vision appeared, acting divergently. Binocular sight commenced to become normal at moments, two days afterwards, following a course of exercises. By the 20th of May, the patient had acquired normal binocular sight, without effort. He wore his correction. His sight was still good, when we saw him again, three months later.

This patient is of interest for two reasons. No deviation was apparent, and stereoscopic vision came on directly after correction. Moreover, this patient also had strabismic sight.

Case II. The case of Mlle. Em. Mart, aged 17, is rather different. We saw this patient on the 2nd of August, 1904, at the Hotel-Dieu. She presented a paracentral leucoma of the right eye and myopic astigmatism.

Skiascopy: R.: Vertical—11. D., horizontal—6. D.

Ophthalmometer: R. = 5. D. Ast. L. = Normal.

The sight of the right eye after correction, equalled 0.5 only. This girl squinted very markedly outwards and

a little above, but this deviation was not visible at first. With the large diploscope it took a half hour of rather trying exercises to make the neutralization, which was alternating, disappear. Her sight soon became simultaneous, and the diploscope revealed a divergent and sursumvergent strabismus, of which we already felt sure.

Next day, her sight was still simultaneous, and the letters seen by the right eye, armed with its correction, appeared much smaller. We diminished the strength of the spherical glass by 1.50 D. and immediately the letters became equal. Two days later we returned to our first correction: R. E. (horizontal axis —5.—6.) and the letters remained the same size. The sight of the right eye is now 0.9. The binocular vision is normal. In this case, exercises for six days sufficed to cure a strong ametropia, complicated by astigmatism, and a double deviation, one of which was quite considerable. Seen two months later, the sight of Miss Mart . . . remained perfect.

Case III. Here is a quite personal experience. "We have systematically corrected one of our eyes, for some days, tho both are almost equally myopic, 5 dioptres. Some days we have experienced a rather violent disturbance and evident ocular fatigue. The change of sight, tho very appreciable, was rather difficult to define. To the uncorrected eye, the image was naturally much less clear and of diffused outlines. Literally speaking, no diplopia existed, but rather a superposition of objects, unequal in drawing and size. Light chiefly showed this disturbance. Seen in front and at a certain distance, the gas jet had the following appearance: The jet and its cylinder of very precise and very luminous contour, were in the center, surrounded by a very widely diffused object, without clear limits. As soon as the vision became slightly lateral, the two reflections persisted, but without preserving their relation, and the more the vision became eccentric, the farther away they drew from each other. After a week, the habit was acquired and a strong tendency to deviation in the left eye was remarked at this moment; the vision was clear. The trouble persisted rather longer with very luminous objects. The integral correction of our eyes was speedily followed by a return of binocular vision, still, it required some days to become perfect and natural.

We have dwelt upon our case because it is very significant. A difference of 5 diopters very rapidly determines simultaneous vision, which corresponds to the trouble experienced, then neutralization intervenes, the sight becomes clear, but only one eye acts, and the deviation of the left eye becomes evident.

Other Observations.—We do not wish to extend the detail of these observations. We will, however, quote the case of Dr. G—— of Paris. This colleague, who was about thirty-five years of age, had, for a long time, an unilateral myopia of 6 diopters and a divergent strabismus of 32 degrees. The sight of this eye was normal, after correction, the convergence being very well preserved. It was decided to operate. Nevertheless, on our insistence, his physician allowed us three weeks in which to try orthoptic treatment. Neutralization was difficult to conquer; and to revive diplopia we had to employ 70 diopters of prisms, afterwards rapidly lessened. After six treatments, which did not, on an average, last longer than three quarters of an hour, the sight became normal. Afterwards, our colleague, provided with his correction, found no difficulty in driving his automobile.

To this case may be added the following observations of Parinaud:

A young man of 14 suffering from convergent strabismus of the right eye, of 30 degrees, had myopia of 8 diopters and a hypermetropia of 0.5 D. in the left. "After a year, the strabismus completely disappeared under anisometropic correction."

Tho recognizing that the treatment, logical as it was, had been employed in a totally empirical manner, this cure certainly goes to confirm our ideas on the origin and treatment of certain strabisms.

Lastly, if trouble is taken to seriously examine the eyes of patients suf-

fering from monocular aphakia, which case is of fairly frequent occurrence, in hospitals, a true strabismus, which will only yield to suitable exercises will be invariably remarked, before as well as after correction.

These few examples could be largely multiplied from the number that exist. It seems that the conclusion drawn from them insists on a place for strabismus of a purely visual origin, besides strabismus whose primitive nervous origin appears indisputable. And this gives justice to those eminent scientists like Javal, who have defended the optical origin of strabismus. Their arguments were true and they were often in the right. This remark does not tend to lessen Parinaud's merit, for it is very difficult, nay, even impossible, to cover all cases of strabismus with a single formula. If the well known French axiom be true, "Il n'y a pas de maladies, mais des malades" (there are not diseases but patients), it has been written of strabismus, for an affection with more varying symptoms does not perhaps exist. It may be said without exaggeration that one does not come across two strabismics in a hundred exactly alike, so much does the individual character show itself in the smallest details. In any case, theories are but relatively truthful, however ingenious they may be. They are imagined to explain and arrange facts, and ought to be mixed with a slight indifference, an indiscreet curiosity.

Otherwise the dangerous custom of giving facts an erroneous interpretation is acquired. We have undertaken this work because it seems to us that a too important part in the treatment of strabismus is given to overtheoretic ideas, estimating that it would be expedient, in various clinical affections, to oppose, within limits, an appropriate therapeutics.

The treatment of strabismus is at present understood in very different ways by the greater number of oculists, with no precise rule in its application, and many variations of detail. In any case modifications only deal with operative treatment, which alone counts with the majority of practitioners.

It seem to us that the time has come to apply a little more method and precision to the treatment of so common an ailment. That it is a particularly delicate and embarrassing work is not to be denied. It is not, however, a question of employing any new method, only of utilizing, with more advantage, relatively old aids, and of conciliating as much as possible therapeutics and clinical instruction.

Convergent strabismus is particularly frequent in children, but its origin is not always recognized as the same. It is very often allied to a nervous central disorder (Parinaud), at times the influence of refraction is shown (Donders); and in other cases these two causes mingle so closely that it is impossible to say which part is due to the nervous system, and for which abnormal refraction is responsible. Therefore, we will not attempt to lay down a treatment for these etiologic varieties. In fact, such precision seems to us impossible, and the practitioner should above all be inspired by circumstances.

The greater number of authors agree on the treatment of convergent strabismus, and differences of opinion are chiefly addressed to questions of detail. In one of his lectures published by the Presse Médicale, Professor de Lapersonne has magisterially studied operative indications in strabismus. He has clearly and precisely pointed out the precepts to be drawn from age, refraction, visual acuteness, from the degree of strabismus, and from the patient's antecedents. We cannot do better than to repeat them to our readers.

Speaking of surgical treatment, he insists on the reason for rejecting too hasty intervention, that is, before the patient is ten years old. Too early operation may result in complete failure, and even in a disaster difficult to repair. We will not speak of operations for strabismus; their indications and technic have been set forth with precise and circumstantial detail in Dr. Terrien's fine "Treatise on Ocular Surgery."

When a child suffers from strabismus the primary treatment consists in an earnest and serious examination,

and an exact optical correction. Orthoptic treatment ought, afterwards, to be seriously prescribed, whenever visual acuteness is normal, or tends to become adequate. We here give some rather important details on this subject.

The strabismic child very often presents amblyopia ex anopsia of one of its eyes. This amblyopia is considerable at times, and prevents all reeducation of binocular sight; therefore, our efforts should, first of all, be centered on its cure. The greater number of specialists order as an efficacious means, the wearing of an occlusive band, or an opaque disc, on the healthy eye. This, according to our idea, is a means that should never be employed, unless one is forced to it; it has the serious disadvantage of being long, tiresome, and only too often inefficacious. Amblyopia submits, with bad grace, to this treatment; and on the other hand, it is satisfied with rather weak visual acuteness, which it does not try to further enlarge.

As we have already said elsewhere, it is better to make the patient exercise under supervision. After bandaging the healthy eye, the letters, which assist visual acuteness, are brought rather close to the patient, so that he can distinctly read the largest characters with his amblyopic eye; they are then progressively drawn away. We have, in some cases, been able to increase the visual acuteness of the amblyopic eye by several tenths with a single treatment. In spite of all efforts, in other cases the acuteness makes very slow progress. The only fault of this treatment is the fatigue it imposes on youthful patients, which necessitates, particularly at first, exercises of very short duration.

As soon as visual acuteness attains at least a tenth, orthoptic exercises ought to commence. Javal had recourse to the stereoscope, and it is on this instrument, more or less modified, that most oculists depend. Convergent strabismus can certainly be cured in this way, only the use of the stereoscope in such an affection appears almost paradoxical. Indeed stereoscopic sight demands parallel ocular axes, that is to say, of relative divergence. Doubtless this fact explains the very great difficulty which this treatment presents. Moreover, the stereoscope has other faults no less grave. Experiments with this apparatus are difficult of control, exercises can only be made at a short distance, and above all, stereoscopic vision differs from binocular vision. It seems, then, once divergent strabismus cured, that this apparatus may be of use with a view to obtaining slight surcorrection. Its use after the cure of convergent strabismus would not be advisable.

The length and difficulty of such a method had doubtless far from encouraging results. The following phrase of Javal, quoted by Professor de Lapersonne, demonstrates this fact: "The reestablishment of binocular vision by exercises usually requires as long a time as that which has elapsed since the commencement of deviation. A child of eight who commenced to squint at four may be cured at twelve years of age."

Many other forms of apparatus have been employed since this epoch, such as the amblyoscope. But among them all, Rémy's diploscope appears to us to assure the best and easiest results. The marvelous precision of this instrument, its variety of exercises and the ease with which it is understood and may be controlled at every instant, allow of its use, even with very young children. We have treated a four-year-old baby, by replacing the letters, which he did not know, by the figures of animals. His German governess explained the movements to him and we have obtained the most excellent and unhoped for results.

The end to be attained in the first place is diplopia. With a little practice in varying the letters, and the intensity of light . . . neutralization is generally vanquished fairly quickly. Consequently, the exercises assist two objects; they make the amblyopic eye work, and strengthen its acuteness; they contribute at the same time to lessen the deviation of the eyes.

If taken in good time, and if secondary modifications have not already appeared in the muscular apparatus,

there is every chance of obtaining entire success. It must not, however, be denied that the cure of strabismus by exercises is, as a rule, long and arduous. It demands the hearty cooperation of the patient, and unending patience in parents and doctor. There are many reasons for this, but the greatest of all is the difficulty of obtaining divergent movements of certain duration. Still, as good results follow fairly frequently, one must not despair too quickly.

Even where these means fail to cure, the exercises prepare the ground in a wonderful manner for surgical intervention. To commence with, they cure the amblyopia ex anopsia, they revive diplopia and finally and notably reduce deviation. The surgeon will know exactly what the operation demands and it will be performed under the best possible conditions. Even then, the oculist's part is not ended. In an immense majority of cases, no operation, however successful, gives more than a cosmetic result. It is therefore the moment to continue orthoptic exercises, which are alone capable of assuring a complete and definite result, by inducing perfect binocular vision.

While on this subject, we cannot agree with the many practitioners who content themselves with advising parents to buy a stereoscope, and some Javal's cards. Stereoscopic exercises, interesting tho they be, are too difficult to control. The doctor's presence is a necessity, otherwise parents and patient quickly relinquish the instrument. Diploscopic treatment is preferable, on account of its rapidity, as well as for reasons already given. Stereoscopic vision should not be exercised until the patient can easily do the exercises of both diploscopes, and then only with a view to obtaining slight overcorrection. Naturally optical correction must not be neglected, whenever it may be useful to increase visual acuteness.

Thus, the cure of convergent strabismus is far from being the simple and easy matter it is so wrongly thought to be. On the contrary, it demands sustained effort from the patient and necessitates in the doctor the closest vigilance and much facility in the practice of exercises.

DIVERGENT STRABISMUS.

Even in the most justly appreciated and widely spread treatises, the accepted opinions on divergent strabismus seem to us to call for a few reservations. With the exception of the most recent works, the greater part of which have appeared in periodicals, their authors are, more or less, partisans of surgical intervention. With them, operation is the chief element of success, and orthoptic exercises are of much less importance, having only a complementary value.

This idea, shared, moreover, by the majority of oculists, depends on various reasonings. The reports on convergence and the much narrower accommodation here, the slow evolution which often precedes insufficient convergence and its habitual tendency to increase, help to render divergent strabismus rebellious to all optical treatment. Thus, operation was advised in the greater part of strabismic cases, even when the strabismus was unimportant and periodic.

We have not agreed with this opinion for a long time. In all that concerns divergent strabismus, we repeat what we have said with regard to convergent strabismus; each affection is distinct and requires careful study, not only of its actual symptoms, but as far as possible, of its probable causes.

Indeed, it is very certain that in this form of strabismus the reports of convergence and accommodation are far from bringing about such direct consequences, and it is equally certain that evolution here tends towards aggravation rather than cure. Does this mean that we must look upon dioptric treatment as useless and relegate it to the position of a mere accessory? We do not believe so and we will explain why.

To do so, we must insist upon two essential points intimately allied to the pathogeny and treatment of divergent strabismus. Divergent strabismus and insufficient convergence have been united to such an extent by so many authorities that it is difficult to take the other side. In fact, strabismus, ac-

cording to them, is very often preceded by more or less congenital insufficiency of convergence. There is some truth and considerable error in this view.

It often happens, and Parinaud, with perfect right, insists on the fact, that insufficient convergence is the first distant cause of divergent strabismus, which appears at a very much later date. This insufficiency appears to be of nervous origin, and it is, moreover, seldom accompanied by refractive troubles. The sight of each eye is normal. As soon as the patient makes efforts at convergence, one of the eyes becomes fixed and does not pass over the median line. Fatigue and even pain quickly follow a prolonged effort, without a sensible increase of convergence. In the adult, this insufficiency frequently develops into a more or less important strabismus. But such cases seem rather rare; at least, they have always been exceptional in the cases of strabismus we have attended.

Besides this ordinary insufficiency, which is very prominent and generally congenital, one might almost say essential, there exists another insufficiency of convergence, which often attacks both eyes, but as a consequence of strabismus instead of a cause. The absence of convergent movements brings about fatigue, and actual muscular impotence. It is found in the careful examination of patients suffering from a fairly old divergent strabismus, that sustained efforts at convergence very rapidly produce in the ocular globes, badly coordinated oscillatory movements, which tend to a very imperfect convergence. It is therefore a question of acquired weakness, not functional impossibility, for if patients are submitted to continuous appropriate exercises the rapid reestablishment of functional convergence is nearly always brought about. On the other hand, the insufficiency may be due to other motives, and it may, in certain cases, be entirely at fault. We can recall patients who suffered for ten years and more from divergent strabismus, without presenting the very slightest degree of insufficient convergence.

Another and no less important point of which we have already spoken concerns the optical origin of divergent strabismus. The most common cause of adult strabismus, outside those injuries and disorders of the eye capable of compromising binocular vision seriously enough to authorize its reestablishment, is anisometropia, that is to say, a difference in refraction between the two eyes. For some time the trouble induced is perhaps more real than apparent; the ocular movements seem normal, the convergence itself appears unaltered. Nevertheless a closer examination demonstrates the almost complete destruction of binocular sight, and we learn on interrogation that the gaze deviates at times. This deviation often becomes more apparent than pronounced, at other times it develops into an evident and even important divergent strabismus.

It is necessary to lay stress on these two factors, so important is their part in therapeutics. We will now demonstrate that they really constitute the greatest obstacles to a cure.

Many authors agree in asserting the impotence of dioptric treatment in divergent strabismus. This impotence is, in great part, due to the inefficacious remedies opposed to anisometropia and insufficient convergence.

Let us put the strabismus united to congenital convergence on one side. It is rather a case, and is less a question of treating strabismus than of remedying insufficiency. If medical treatment appears incapable of success, there is always the resource of surgical intervention, after which a few exercises generally suffice to restore binocular vision.

Divergent strabismus is frequently united to anisometropia. It must be acknowledged that an entirely empirical treatment has been too long looked upon as a cure. The patient, once provided with an excellent correction, should, without further indications, accustom himself to this correction. Ignorance as to the disorders of binocular vision, and the absence of controlled apparatus were responsible for this way of thinking. Clinical surprises are often curious, and it has occurred that some patients have been more or less rapidly cured by this means. Generally,

they have quickly given up the correction, which, far from ameliorating the sight, became a sources of serious inconveniences, such as vertigo, nervous headache, false relief, and dizziness. Taught by these facts, practitioners have wisely dissuaded the correction of anisometropia greater than a diopter and a half.

In our turn, aided by Rémy's diploscope, we have resumed this study, and found reasons to oppose an integral correction. These reasons are two in number; strabismic deviation — the cause of more or less obvious diplopia, which is often sufficient to awaken improved visual acuteness—and the unequal size of objects seen by each eye. Many years of experience convince us that the inequality in the size of objects, which is such a trouble to the patient in the beginning, never persists. It is not so with deviation; this requires a more or less lengthy treatment, and only yields to a course of suitable exercises.

We lay stress on the fact that the difficulty in curing an anisometropia and its accompanying deviation does not depend on a more or less marked dioptric difference—an anisometropia of ten diopters may be much easier to cure than another of three diopters. It is equally independent of the greatness of the deviation itself. The real difficulty arises from the insufficient degree of convergence. That it is which causes all delays in cure, therefore our first effort ought to be to diminish and vanquish it. Convergence once established, victory is at hand, for the reeducation of binocular vision becomes henceforward rapid and easy.

The habitual treatment of insufficient convergence ought always to be pleasing. If it is a question of a slight degree, the wearing of prisms, or the decentering of corrective glasses is generally advised. This method presents some grave disadvantages; it makes an inadequate, heavy, and sometimes dangerous palliative.

The insufficient convergence common to strabismus is far from having absolute stability, therefore prismatic correction has not all the precision one could wish. On the other hand, if it exceeds, by ever so little, a few diopters, the glasses become too thick. One may even add that the cases which might be benefited by this treatment are rare. Lastly, and herein lies its principal fault, this method does away with all serious and useful efforts on the part of the patient. Now, it would be better, if possible, to reestablish an important function, all the more easily cured, because frequently united to a weakness due to actual alteration. For that reason, the procedure of reeducating convergence is more preferable. Tho undoubtedly more difficult, it has the incontestable advantage of curing the affection and may be applied to all sorts of cases, even to those of a degree opposed to prism correction.

Stereoscopic exercises are often prescribed to improve insufficiency. This method, faulty as it is,—we have given the reasons,—may be of service. But it must never be more than a preliminary treatment for strabismus endowed with stereoscopic vision. Completion of cure demands diploscopic exercises.

When insufficiency is accompanied by marked deviation the greater number of oculists indicate operation as the best treatment. We have given our opinion on surgical intervention in such cases. In itself incapable of producing a cure, it gives a mere cosmetic result, and ought to be invariably followed by reeducatory exercises. Nor do we believe that the duration of this indispensable work is sensibly diminished by operation, for we have seen important divergent strabisms cured in less than ten treatments by the orthoptic method alone. Outside those cases where reeducation is impossible, one must never, as is often so mistakenly advised, operate at the first onset. A wisely conducted medical treatment will usually suffice, and the patient will gratefully avoid intervention that can, however, in case of necessity, be resorted to later.

We will rapidly sum up our usual course of treatment in the greater part of cases of divergent strabismus.

In the first place integral correction of the ametropia, no matter what the

degree, or how marked the difference in refraction between the two eyes.

If this correction is not sufficient to stop neutralization, and this happens frequently where the deviation is very marked, we try to revive diplopia. Many excellent means may be utilized to this end either simultaneously or separately. Diploscopic exercises, colored glasses, and different degrees of light will often suffice. In rebellious cases, prisms must be resorted to. We have employed 70 diopters of prisms, in the case of one of our patients (Dr. G——). Ordinary prisms may be used. Dr. Rémy's rules are most convenient, but the turning prisms of Landolt or Risley seem to us to be most favorable.

As to faults of insufficiency and convergence they ought to be opposed by exercises adapted to the type of the deviation, the enumeration of which would alone lead to unnecessary length. First experiences are often painful and trying (they brought on syncope in one case) but the patient quickly gets accustomed and interested in his progress, and given determination, the cure will be rapid and complete.

In conclusion, we wish to say a few words regarding two fairly frequent cases. Divergent strabismus frequently coexists with slight vertical deviation. Each time we have come across it, it has disappeared, with exercises, at the same time as the horizontal deviation.

The following observations concern certain pronounced squints due to considerable anisometropia. In an affection of this class (15 diopters of anisometropia and 22 degrees of divergent strabismus) we have been astonished that the patient, who had perfect binocular vision, with the diploscope, continued to see double in the street. We had therefore to proceed to the reeducation of peripheric binocular vision. We used Professor de Lapersonne's perimeter with perfect results. The use of this instrument is certainly more practical than the mural method prescribed by Lagrange.

Such is briefly recapitulated the treatment that at present seems to us the best means of curing divergent strabismus; it is decidedly the most rational. Without doubt it demands a certain apprenticeship in the beginning and may on that account seem too lengthy. But a little experience and custom will rapidly bring about the discovery of a more rapid process and short cuts that will save precious time.

CONCLUSION.

Owing to its double nervous and optical origin convergent strabismus requires a treatment that is long and particularly delicate to establish, but in which reeducation of binocular vision is essential. Where possible this constitutes the preferable method, as well as the indispensable complement to surgical intervention. We ought to beware of the opinion of a great number of excellent oculists, who believe divergent strabismus can only be relieved by surgery. With a few reserves, we hold the contrary to be the truth, and it is chiefly in this case that orthoptic treatment gives the most rapid results and brilliant successes.

The first conditions of treatment are an exhaustive study of each case and a profound knowledge of facts. In spite of which, the not alone apparent, but true cure of strabismus frequently remains a very real difficulty; but this fact, far from discouraging us, ought rather serve to render us more exacting in the end to be attained and more severe in our choice of the right means with which to obtain it.

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METASTATIC INFILTRATION OF CORNEA (RING ABSCESS).

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Ring infiltration or abscess may arise from infected injury of the cornea or metastasis. This case followed verv severe burns with infection, the eyes remaining without serious harm for a week. One was lost, the other retained some vision, probably because there was early rupture of Descemet's membrane.

The case, which is reported in this communication, is of interest because it evidently belongs to that class of serious corneal lesions, metastatic ring abscess, which fortunately are very rare.

Ring abscesses of the cornea seem to fall naturally into two distinct classes, those due to infection following wounds of the cornea, and those due to metastatic infection. Of the 22 reported cases, 11 followed accidental wounds of the cornea, 4 occurred after cataract extraction, and 7 have been regarded as metastatic. None of the early cases reported by Fuchs,[1] Collins[2] and Morax[3] were metastatic. Of the reported cases in this latter class, Weiss'[4] case had a complicated fracture of the femur; Hirschberg's[5] suppurative cystitis; Herrenheiser's and Winterstein's[6] cases (referred to by Fuchs) puerperal septicemia; Axenfeld's[7] case, cryptogenetic pyemia; and Giri's[8] case, "Henoch's" purpura. Herbert[9] reports a case of metastatic ring infiltration of both corneas in a case of severe septicemic plague. The case herewith reported is the eighth recorded case due to metastasis, the second in which both eyes were involved; and is very unusual in that there is not a complete loss of vision in one affected eye. The other was completely lost.

CASE REPORT.—V. P., male, 36 years of age, foreign born, was a strong, well developed, muscular laborer who had never had any illness that he could remember. On *September 20*, 1919, while carrying a bucket of live coals, he accidentally dumped the redhot coals into a pit of water which filled the pit with live steam. His entire body was burned by the steam, the deepest burns, which were of the third degree in some places, being about the feet, hands and face. The man was sent to the hospital and the burns were dressed in the usual way with oil and wax. A mask was made which covered the face except eyes and nose. Both eyes were irrigated three times daily with boric acid solution. In neither eye was there very marked swelling of the conjunctiva, and both corneas remained perfectly clear for eight days But a copious secretion from the conjunctival culs-de-sac was present after the third day.

September 29, nine days after the accident, the attending surgeon first noticed some haziness of the left cornea. Patient was first seen by the writer on the evening of this, the ninth day. The following conditions were noted at this time: In the left eye there was a yellowish gray sharply defined ring of infiltration about 2 mm. in width and 1½ mm. distant from the corneal limbus, concentric with it and extending almost completely around the cornea, being incomplete below for a distance of 3 or 4 mm. The lower parts of the infiltration area were slightly narrower than the upper, and were less distinctly outlined, the infiltration area appearing as a narrow crescent rather than as a ring. The peripheral margin of the infiltration area was very sharply defined, and the inner edges less clearly marked. Directly above in the area of infiltration there was a corneal ulcer 1x2 mm. with very clear cut edges involving a part of the corneal stroma. The center of the cornea and the peripheral ring of the cornea were perfectly clear. The aqueous appeared very muddy. The pupil was small, inactive and was filled with a slightly yellowish exudate. There was no hypopyon. On this date the right cornea was still perfectly clear. The ulcer was painted with tinctur of iodin, and hot fomentations, atropin and bichlorid ointment were ordered.

September 30: Fourteen hours later in the left eye the ulcer had extended

half way around the circumference and entirely thru the stroma. Descemet's membrane having prolapsed into the ulcerated groove for about one-third the circumference; and, directly above it, had ruptured, exposing the iris. The yellowish-gray ring had become complete below. The anterior chamber was now filled with a yellowish exudate and the entire center of the cornea was hazy.

Right eye now (14 hours after first examination) presented a gray, ring-like crescent above, extending one-third around the cornea, about 1½ mm. from the limbus and concentric with it. Directly above, in the infiltrated area, there was a clear-cut ulcer ½x1½ mm. extending deeply into the corneal stroma. Iris reacted sluggishly to light, and an exudate partly filled the pupil. The ulcer was thoroly painted with tinctur of iodin.

October 1: The area of necrosis, left eye, involved the entire ring area, the ulcer having extended completely around and thru the corneal stroma, giving it the appearance of the familiar deep, clear-cut, groove ulcer; Descemet's membrane only remained as a base or hinge for the ulcer below, the iris being the base above. There were signs of well developed panophthalmitis.

October 2: Of the left cornea there remained only a rather hazy peripheral ring 1 mm. in width. In the center of the globe there was a mass of necrotic tissue, iris and exudate. The conjunctiva was chemotic. At no time had the patient suffered much pain. The discharge was very profuse.

In the right eye the infiltration ring had extended about two-thirds around the cornea, being incomplete below. Above, the ulcer had spread one-third around and had penetrated to Descemet's membrane, which had prolapsed into it. The aqueous seemed quite clear as compared with the yellowish color of the left on the first day. The pupil was filled with a gelatinous looking exudate. Fearing that his eye would go the way of the left, heroic treatment seemed to be demanded, therefore cauterization with carbolic was decided upon. During the application Descemet's membrane ruptured, evacuating the anterior chamber. This was not done intentionally. The usual treatment was then followed.

During the following three days the ulcer in the right eye did not spread perceptibly. The iris became the floor of the ulcer above, but the infiltration ring did not become complete. There was no hypopyon.

During the period September 29, October 1, 2, 3 and 4, the patient's temperature fluctuated between 102° and 103°F. His pulse was feeble, he was semidelirious (under opiate) and he seemed to be a very sick man. His recovery seemed unlikely. The temperature remained high (103°F.) and his general conditions seemed very precarious until October 9, when temperature suddenly fell to 100°. It became normal on October 13. The general condition of the patient showed marked daily betterment from this date.

October 3: The left eye was merely a mass of intermingled necrotic tissue, blood clot and pus. On account of the low state of the patient's general condition, the eye was not removed until November 4.

From *October 2 to the 9th*, the condition of the right eye showed very slight daily change. The ulcer did not extend, and the infiltration crescent or ring did not materially change. After the 9th there was noted daily improvement until the ulcer completely healed, the infiltration area becoming smaller daily, clearing at first from below. There finally resulted a dense leucomatous scar in the upper third of the cornea with an adherent iris; but there remained a fairly clear central area of the cornea, and a clear pupil, permitting a central visual acuity of 20/65.

Discussion.—I feel that in this case the infection did not originate from a corneal wound, altho there must have been at least a superficial destruction of corneal epithelium. A clear cornea was noted by the attending physician for the first eight days following the burn. When the right eye was first seen by me, which was on the ninth day, it was very carefully examined, using a loupe and oblique illumination.

and it was found to be free from any ulceration, burn or abrasion.

The rapidity of the formation of the ring-like area of infiltration, concentric with the corneal limbus and 1½ mm. from it, the yellowish-gray appearance of the infiltration, the rapidity of the corneal necrosis (the left cornea being completely destroyed in 36 hours), the presence of iridocyclitis prior to, or at least coincident with, the infiltration and ulceration, and the rapid total destruction of the entire eyeball from the ensuing panophthalmitis, are characteristics of "ring abscess" as described by Fuchs and others. The severe toxic condition of the patient, and his approach to general physical exhaustion undoubtedly reduced the vital resistance of the cornea and contributed to the necrotic process. The iridocyclitis was in all probability due either to endogenous toxins, or to a metastatic infection. Deep burns about his hands and feet were discharging pus freely at the time of the corneal involvement, and may most certainly be regarded as a very adequate focus from which bacteria or toxins might have been carried to his eyes. I am of the opinion that this case was due to metastasis and not to a primary corneal wound. Cyclitis was present at the time of the onset of the corneal ulceration.

The pathology of ring abscess has been studied by Fuchs,[1] Hanke[10], Morax[3] and Parsons.[11] No specific microorganism has been found, but streptococci, staphylococci and bacilli have been. Hanke describes a peculiar bacillus which he claims as a cause, but not necessarily the specific cause. There are several theories advanced to explain the phenomenon of ring abscess. According to Fuchs, the bacteria which are responsible for ring abscess, altho they usually enter the eye by a perforating wound of the cornea, attack the cornea from behind, and set up a purulent iridocyclitis and keratitis. He pointed out that the area of infection is not in direct continuity with the wound, and presented some convincing evidence to show that the infiltration ring follows from the immigration of leucocytes from the peripheral vessels, these being directed toward the necrosed parts. Giri has advanced a different theory to explain the phenomenon of ring infiltration. He states that it is essentially a ring of infiltration neither to the wound nor to the necrotic cornea, but to the toxin pervaded area of the cornea.

In reviewing all the reported cases of ring abscess we find, in addition to the infected corneal wound or remote focus of infection, that there is almost invariably present a decided low vitality; and I believe that this is an important etiologic factor in the causation of infiltration ring abscess.

In the treatment I feel that in the right eye the early accidental rupture of Descemet's membrane, which reduced the intraocular tension, affording better drainage as well as better circulation, was a fortunate occurrence. In the future I would advocate an early free opening of the cornea in similar cases.

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FOREIGN BODY IMPACTED IN THE SCLERA AND RETINA, LOOSENED UNDER DIRECT OBSERVATION WITH OPHTHALMOSCOPE AND REMOVED.*

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In addition to a case referred to in the title and illustrated, one is mentioned in which the foreign body was loosened but proved nonmagnetic. An account of the first case of the kind reported by Haab is also included. Illustration is from a sketch by Dr. W. A. Cassidy.

V. N., male, age 21, consulted us July 30, 1919, with a history that while doing some emergency work on his car a piece of steel was driven from the shaft by a blow of a hammer, and struck him in the right eye. For a few days the vision was somewhat impaired but this soon cleared up and he had no further trouble for about three months, when he noticed that his vision was slowly failing in that eye.

When he consulted us he had vision of counting fingers in the right eye and 20/15 in the left. Ophthalmoscopic examination showed the left eye normal. The right eye, pupil widely dilated, disc slightly indistinct, central retinal region somewhat blurry, some slight displacement of retinal pigment down and out, a few fine bright lines looking like small obliterated vessels running through this area. About 2.5 disc-breadths down and out from the disc, near the center of the area of displaced pigment, there was a large grayish brown mass, two or three diopters in height, rather rectangular in shape and having the appearance of an oxidizing metallic substance. The tension was normal and there was no discomfort.

Fig. 1.—Bit of steel embedded in retina and sclera (Patton's case).

As there was practically no question about the character of the foreign body, the giant magnet was tried repeatedly without result and with no change whatever in the appearance of the

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grayish mass. As the eye was apparently degenerating, due to the presence of the foreign body, on the suggestion of Dr. Gifford, I explained to the patient the possibility of loosening the foreign body by means of a knife or needle; and that while I might be able to remove the foreign body, it would entail a certain amount of risk so far as the eye was concerned. I also explained to him that unless the foreign body was removed, the prognosis, so far as keeping the eye was concerned, was very poor.

He decided to try the operation, so after anesthetizing the eye and in addition injecting two or three drops of 10% cocain solution just to the nasal side of the insertion of the inferior rectus muscle, I passed a Knapp knife needle down to the object and was much gratified in being able to detach it from its position in the sclera. I was surprised at the clearness with which I was able to follow the point of my knife and at the same time feel a grating sensation when it came in contact with the metallic substance. The foreign body was then easily drawn into the anterior chamber and removed thru a corneal incision in the usual way. The patient suffered no inconveniece whatever, altho there were a few fine stringy vitreous opacities seen a few days after the operation.

After several months the patient reported that the sight was gradually improving, there was no pain of any kind in the eye, and the pupil was practically normal in shape and size.

Haab reported the similar removal of an impacted foreign body some years ago, and as we were unable to locate the report, we wrote him and he was kind enough to send the following from the Correspondenzblatt für Schweizer Aerzte, 1898, p. 270:

"Finally a case was reported by Dr. Haab which gave occasion for a hitherto unused procedure which in certain cases may favorably assist a magnet operation. The author in the past September succeeding in removing a piece of iron which had remained since the previous January in the retina of a locksmith, and which, having been left alone by the doctor who first saw the case, had meanwhile become healed in that position. He did this by means of a long cataract needle which he introduced into the globe from the side, loosening the foreign body and then drawing it out with the giant magnet. This somewhat difficult operation of loosening could only be carried out by looking into the eye with the ophthalmoscope at the same time, which made it possible to bring the point of the needle directly thru the vitreous up to the splinter. The splinter was situated about six millimeters in and up from the nerve. The eye, which was, as a result of the inflammatory changes which had occurred before the operation, entirely blind, gained by the operation no more useful vision, but was, however, rid of the splinter and the method might well be of good service in other more favorable cases."

I have made one other attempt to remove a piece of impacted iron from the retina and was able to dislodge it with the point of the Knapp needle but was unable to bring it forward with the magnet. Becoming suspicious after several attempts that the piece of metal might not be magnetic, I had the hammer from which it was supposed to have been thrown off tested with the magnet and found that it did not respond. But in this case I was able to guide the point of my needle very easily and could distinctly feel the grating when it touched the metallic substance. I have known of several attempts having been made to dislodge impacted foreign bodies and it is quite possible other cases have been reported but I have been unable to find them. I am sure that in cases where magnetic substances have become impacted in the retina, owing to the very unfavorable prognosis so far as the future of the eye is concerned, we are entirely justified in attempting this procedure.

Three things are essential; thoro cocainization, wide dilatation of the pupil, and a knife needle with a sufficiently long shank so that there may be no trouble about reaching the foreign body.

GLAUCOMA AFTER CATARACT EXTRACTION.

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Three cases of glaucoma occurring after the extraction of cataract with iridectomy are here reported. The observations of previous writers upon this subject are cited and the essential character of the condition giving rise to it is discussed. Read by invitation before the Buffalo Ophthalmologic Club, January 13th, 1921.

It would seem that removal of the crystalline lens by combined extraction renders an eye less liable to increased intraocular tension. A considerable bulk of the internal structures of the eye has been removed (the lens and a portion of the iris) while the remaining iris occupies a plane posterior to its former position, where it rested on the anterior surface of the lens, thus deepening the anterior chamber.

I desire to report briefly three cases which have come to my attention within the past six months of increased intraocular tension secondary to combined cataract extractions.

That this sequel to successful extractions has occurred to others is evinced by occasional reports in literature. It is quite probable that in the past I failed to attribute to simple glaucoma the failing vision in aphakic eyes occasionally met with and which a change in lenses would not benefit, being content to regard it as due to simple senile atrophy of nerve and retina.

In this class of cases the perimeter is of no value as a diagnostic aid, since with the correcting lens worn the prismatic effect of the edge of the lens so narrows the field that the examination is totally unreliable, while without the lens worn the targets, unless they be of huge size, cannot be seen.

The ophthalmoscopic picture of the disc likewise is of little value as it is most difficult to recognize a cupping in the small image seen under these circumstances.

The diagnosis can be made with the tonometer alone and the history of failing vision in the simple chronic cases, and the usual history of sudden nauseating pain in the eyeball with the congestive picture in acute cases.

No reference will be made to glaucoma following occlusion of the pupil after cataract extraction. These observations are confined to successful lens extractions with good vision, open pupils and quiet eyes for varying periods of time.

Case I. G. N. D., age 42, painter. Appeared May, 1909, with a history of having injured his left eye five days before while opening a can of paint with a chisel.

Examination revealed a cloudy lens with a dark triangular foreign body deeply embedded in the nucleus of the lens and a faint healed scar in the lower quadrant of the cornea. The right eye had been blind with a cataract for eight or nine years.

The left lens was extracted with iridectomy, recovering the small foreign body, which proved to be a chip from the chisel or hammer. The eye made an uneventful recovery with ultimate vision corrected of 6/6. The right lens was removed by combined extraction two months later, the eye requiring a discission afterwards for a cloudy posterior capsule. The ultimate vision in the right eye was 6/20.

Not until August, 1920, more than ten years after the lens extraction, did the left or better eye give him any concern. He then appeared with a well marked bullous keratitis, tension 70 McLean and vision reduced to counting fingers at one foot. This condition had begun about three weeks before.

Miotics of considerable strength used for a week had no effect in reducing the tension, altho strongly contracting the pupil. The eye was then trephined at the lower limbus. A considerable amount of viscid fluid escaped thru the trephine opening. The eyeball became so flaccid on the table that the cornea was markedly indented. Strict injunctions were given to keep the head absolutely quiet for three days to safeguard as much as possible against the retina becoming detached. The eye was inspected on the third day; healing of the conjunc-

tival flap was satisfactory, the contour of the ball had returned and the bullous condition of the cornea had disappeared.

He was discharged three weeks afterwards with vision corrected of 6/20, tension 20 McLean. When last seen, December 7, 1920, the condition was practically the same.

Case II. F. E. S., merchant, a myope since childhood, who had never had better than 6/15 vision corrected. In February, 1919, at the age of 75, a combined extraction in the left eye resulted in vision of 6/7 corrected, which he enjoyed for a year and a half.

His wife's death, followed shortly afterwards by the death of his eldest son, gave his nervous system a tremendous shock. On August 4, 1920, vision was reduced to 6/15 and the tension of the eye was 38 McLean. As a supporting measure he was given tabloids mixed glands. Pilocarpin was used locally and improvement in vision and tension was apparent within a week. At the last visit, January 4, 1921, vision corrected =6/7, tension 24 McLean.

Case III. Mrs. E. G., age 68, when combined extraction was performed upon her left eye, March 18, 1920. The operation and healing were uneventful with the exception that the anterior chamber was still open at the peak of the incision, three weeks after the operation. June 9, 1920, her correction was ordered; giving her vision of 6/9. This patient is totally deaf, a cripple from intracapsular fracture of the hip and lives in a rural district.

She was brought in July 15, reporting that a week before she had had severe pain in the operated eye and that she had lost her sight. Vision corrected = 6/60, tension 60 McLean. Eserin and pilocarpin solutions used alternately gave some relief, reducing the tension to 40 McLean, the vision improving to 6/30 corrected. Operative measures to reduce the tension were discussed and urged, but for one reason or another were deferred until December 8, 1920, when the patient appeared with tension of 60 McLean and vision reduced to counting fingers at one foot, despite the constant use of miotics.

The eye was trephined at the lower limbus and iridotomy performed. Healing was prompt and the result was ideal, the tension being reduced to 28 McLean. There is no improvement in vision, however; the disc viewed with the ophthalmoscope is chalky white.

Chance[1] has summed up the generally recorded experience regarding glaucoma following extraction, believing it to be rare. The late Dr. Risley in discussing Chance's paper reported the case of a patient who had been successfully operated upon by a simple extraction, leaving a round, mobile central pupil. In two weeks, after secondary capsulotomy, there was an attack of acute inflammatory glaucoma, Tn. + 2.

An iridectomy was performed and a viscid semifluid substance escaped thru the incision. Relief was prompt, vision rose to 6/9 and there was no recurrence. Dr. Risley believed that a paracentesis would have been sufficient in relieving the symptoms without an iridectomy, the spaces of Fontana having been blocked by the viscid contents of the anterior chamber, probably semifluid vitreous, which had come forward thru the rent in the posterior capsule. Risley reported at this meeting an additional case of secondary glaucoma following a combined extraction. The immediate result had been excellent, V=6/6. Seven years later he had an attack of pain in the eye with numerous recurrences of variable severity for six months. When finally examined in the clinic the eye was blind, Tn. + 2. The media were clear and a deep typical glaucomatous cupping of the disc could easily be demonstrated.

Akatsuka[2] found glaucoma after discission of secondary cataract, which he explains by prolapse of vitreous into the anterior chamber and secondary closure of the sinus.

Bulson[3] reported two cases of secondary glaucoma following combined extraction with large peripheral iridectomy at the 1907 meeting of the American Academy of Ophthalmology and Oto-Laryngology. Edward Jackson in discussion stated that he believed the secondary glaucoma to be due to an altered condition of the aqueous rather than to closure of the filtration

angle and that some operation intended to maintain drainage thru a fistulous opening under the conjunctiva seemed the rational procedure.

Lebensohn[4] records a successful case of trephining for glaucoma following cataract extraction.

One of my cases was characterized by semifluid vitreous escaping thru the trephine opening and with the testimony given above I lean strongly toward the view that the vitreous closes the spaces of Fontana and is the chief causative factor in blocking the filtration angle. The vitreous, it will be remembered, consists of a clear liquid substance inclosed in the meshes of an equally transparent reticulum. It contains cells which have a varying shape, found particularly in its outer layers and which, according to Schwalbe, may be regarded as white blood corpuscles which have traveled into the vitreous. The vitreous, moreover, can readily become fluid as the result of disease of the adjacent membranes or as a simple senile change.

There may, however, be other reasons for its occurrence and it is probable that my third case was due to epithelial ingrowth. Collins[5] enumerates the causes of the secondary glaucoma seen after cataract extractions as follows: (1) Epithelial cyst of the chamber; (2) iritis and keratitis punctata with changed character of the aqueous humor and blocking the spaces of Fontana with inflammatory cells; (3) blocking of the angle of the chamber, brought about by adhesions of the lens capsule or of the anterior hyaloid membrane to the extraction cicatrix. Adhesions of the capsule to a limbal incision rarely cause glaucoma.

Elschnig[6] reported a case in which severe glaucoma occurred within a month after leaving the hospital after the cataract extraction. The eye was enucleated and on microscopic examination it was found that the whole anterior chamber was lined with epithelial cells, which appeared to be an abnormal ingrowth from the anterior corneo-scleral surface. The epithelium covered the inner surface of the cornea, the anterior surface of the iris and even the remaining lens capsule.

Oatman[7] subsequently reported an almost similar case in which the epithelial invasion followed an eversion of the flap.

Wootton[8] met with glaucoma following combined extraction and due to the gradual ingrowth of the corneal epithelium into and lining the anterior chamber.

Lloyd[9] makes the interesting statement that an elevated tension may be the real cause of delayed union. He reports failure to secure reduced tension after trephining over the opening of the original iridectomy. When a sclero-corneal trephining was done below success was immediate.

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CLINICAL OBSERVATIONS WITH THE SLIT LAMP OF GULLSTRAND.

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The increased usefulness of the corneal microscope thru use of the Nernst slit lamp to illuminate the eye affords many interesting observations of the minute structure of the cornea and iris. Some are here recorded with regard to corneal vessels, keratitis, iritis, and pigment deposits said to appear early in cases of glaucoma.

This valuable addition to the ophthalmic armamentarium is so new that but few observers recognize the pictures presented therewith and consequently these few observations may be of aid. A word regarding the instrument itself. A powerful electric lamp with but a single tightly coiled linear filament is enclosed in a light proof housing which has two rectilinear apertures. Thru these comes a beam of parallel rays the width of which may be varied. This beam is concentrated upon the eye by a focusing lens some 35 cm. from the source of light so that a true optical pencil of light rays, coming to as near a punctate focus as possible, is condensed upon the eye. The illuminated area is observed with the binocular Czapski microscope. The illumination may be of two types: either direct upon the area to be examined or thru the media behind the area, thus bringing out the area in dark field illumination.

New formed vessels within the cornea can be studied with great ease after some practice with the instrument and after some four or five minutes dark adaptation on the part of the observer. But little new has been added to our knowledge of the superficial vessels. However, the deeper vessels stand forth in an entirely different light, especially when viewed with the dark field illumination. They are numerous, far more so than any of the former methods of examination would lead to believe, and seem to be of the single endothelium type. The blood stream carried by the innumerable fine vessels consists of a single or double layer of red cells and progresses by pulsation. Between waves the vessel is partially empty and the walls seem collapsed. But there is no uniformity in the pulsation and it does not synchronize exactly with the radial pulsation. One vessel may show its pulsation and its neighbor, less than one millimeter away, will pulsate at a slightly different rate and at a different time. This is probably due to the distance between the point of pulsation observed and the nearest communicating artery. A pulse wave that has to travel 3 mm. will not appear synchronous with a pulse wave that travels only 2 mm.

It has been claimed that each vessel continues in about the same corneal plane in which it enters the cornea. My observations do not substantiate that; for many vessels have been observed that dip deeper into the corneal stroma or become more superficial as they progress. But in no case do they approach very closely to the limiting membranes of the cornea. The course of the vessels may be very irregular. In a case of beginning interstitial keratitis, one vessel was observed that held a fairly straight course from the limbus toward the center of the cornea. About 3 mm. from the limbus another vessel approached it at a perfect right angle, but just before crossing, turned and became parallel to the first vessel for a short distance. The wanderer then turned away and dipped into a deeper corneal stratum. Very seldom does one vessel cross another in anywhere near the same corneal plane. It would seem as tho a vessel in the deeper cornea was surrounded by some denser tissue that an approaching vessel could not penetrate, but that turned the intruder into a parallel course. This denser tissue would seem to surround the vessels on all sides for quite some distance. Altho the course of two vessels may cross, it is usually in different corneal planes, seldom less than ¼ the thickness of the cornea

apart. Anastomoses of the deeper vessels may be seen near the center of the cornea, but grow fewer the nearer the limbus is approached.

New vessels make their appearance in the cornea much earlier than was formerly believed. A case of monocular interstitial keratitis presented the usual picture and had entered the retrogressive stage. The sound eye presented no indication of disease and did not cause the patient any annoyance whatever. One day the sound eye was examined with the slit lamp and on observing the cornea with dark field illumination, innumerable fine vessels were seen that had progressed almost to the center. No infiltration was visible nor could the vessels be seen by any other method of examination. About two weeks later, there was a faint ciliary injection and beginning deep infiltration of the cornea, which eventually developed into a true interstitial keratitis.

Iritis may be diagnosed with the slit lamp, at least 24 hours and frequently 60 hours before it can be recognized clinically. Any case with a suspicion of circumcorneal injection should be subjected to a careful slit lamp examination of the iris, for the hours thus saved may mean much in the prevention of posterior adhesions. A beginning iritis shows but little disturbance in the color of the iris, and a further development of the disease is usually essential to the presence of fibrin or white blood cells in the aqueous humor, or on the posterior surface of the cornea. But if the portion of the iris lying just peripheric to the sphincter muscle be examined under high power, a dilation of the blood vessels and a slight change in their color can be seen. The vessels seem to fill the individual iris fibers completely so that but a thin bit of pigmented iris tissue separates the vessel from the anterior chamber. This is in marked contrast to the appearance of that portion of a normal iris, where the vessels are scarcely to be discerned. Later, as the disease develops and the iris tissue becomes swollen and its color altered by presence of exudate, this characteristic early appearance is lost, and the iris assumes the picture described by Koeppe and Vogt.

It has been claimed by Koeppe, and contradicted by Vogt, that incipient glaucoma (even a preglaucomatous stage) may be recognized with the slit lamp. The change consists in a peppering of the most superficial layers of the iris with very fine individual pigment granules (Pigment Zerstreuung); and this is claimed to be visible months or even a year before the disease can be recognized clinically. Further investigation and time will have to prove whether or not this finding is pathognomonic of glaucoma. But certain it is that in every case of glaucoma that I have examined with the slit lamp, the iris was peppered with discrete pigment granules. These are brown or black and are so small that they can just be seen plainly with medium magnification (20 diameters). They lie on the surface of the iris, apparently covered wtih endothelium, and extend into the depths of the iris crypts. The peripheric area of the iris contains the granules in the greatest profusion and here they have the appearance of having been sprinkled on to the surface from a fine pepper pot. Koeppe's contention as to the diagnostic value remains to be proven, but the presence of the granules cannot be disputed.

RADIUM APPLICATOR FOR CATARACTS.

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The methods and apparatus employed in using radium for the treatment of cataract are here described, in a way to assist other workers.

Since the publication of our paper on "Radium and Cataracts" (A. J. O., v. 3, p. 643) numerous inquiries have been received concerning the exact construction of the radium applicator. For that reason we are giving a more detailed account of the apparatus and the method of application.

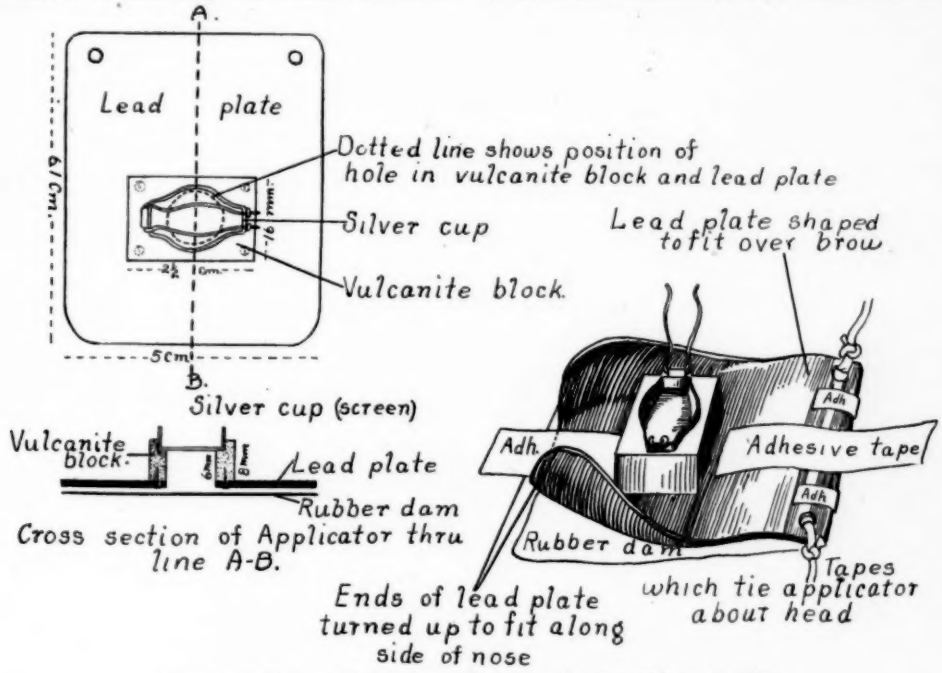

Fig. 1.—Radium applicator for cataracts. Diagram with explanation.

Two main factors were borne in mind in the development of the applicator: (1) a simple method of applying the radium; (2) an apparatus which gave a constant distance and screening, and which guarded against the possibility of a burn.

The applicator consists of a specially designed silver cup with a bottom of 0.5 mm. in thickness, which screens out practically all but the gamma rays. The cup is embedded in a block of vulcanite at a distance of 0.6 cm. from the lead plate; the vulcanite block being attached by means of small screws. A piece of rubber dam is fastened below this plate with adhesive strips. This prevents the possibility of an injury from secondary rays, which in this apparatus would be given off by the lead plate.

The lead plate is 5 cm. by 6.1 cm. and made of 1 mm. lead sheeting. It is shaped to fit over the brow and along the side of the nose. (See sketch.)

A hole 0.8 cm. in diameter (the diameter of the radium plaque) is made directly under the position of the radium. The string tapes which hold the applicator to the head are tied thru two small holes at its upper end.

The vulcanite block is 25 mm. by 16 mm. and 8 mm. high. A depression is made to contain the silver cup, this being measured so that the cup is 0.6 cm. from the bottom of the block. A hole 0.8 cm. in diameter is made directly below the radium. A model of this block

is constructed from sheet dental wax and a dental laboratory readily makes a vulcanite one from it. This is now attached to the lead plate by means of small screws, which any optical concern can supply. The vulcanite has no value as a screen, but is used merely as a convenient method of obtaining a fixed distance.

The silver cup shown in the sketch is made to fit the type of radium applicator used. It can be fashioned by any manufacturing jeweler. The elongation at either end permits handling the radium with forceps. Care should be taken to have the bottom of the cup carefully measured to 0.5 mm., this being the screen for the radium. A simple spring catch keeps the radium in the cup. The cup is cemented into the vulcanite block in the depression made for that purpose.

In applying the applicator the patient is placed in the supine position. The lids of the eye under treatment are held closed by applying a small strip of surgeon's isinglass plaster over the cilia. A small gauze sponge is placed on the eye to prevent the apparatus from coming in contact with the skin. Over this gauze sponge the radium apparatus is placed, and held in position by two tapes tied around the head, and two small pieces of adhesive plaster to the brow and cheek, respectively. The patient is told to fix the ceiling with the uncovered eye, thus bringing the lens of the eye under treatment more directly under the radium. In this method the radium is approximately 1.2 cm. from the eye.

The matter of dosage is rather an uncertain one, varying with each type of radium applicator. A milligram hour is the exposure of one milligram of radium for one hour. The term gives a method of dosage for a given plaque of radium if the conditions of screening and distance are included. In most of our cases we have been giving 10 milligram hours twice a week for four weeks, and then once weekly until the process shows improvement. Following this, one exposure is given monthly for several months. Up to the present time there have been no cases that showed a retrogression. In our private practice we have been using a 10-milligram plaque, which makes the time of exposure one hour. Where a stronger piece of radium is used, the time of exposure is reduced proportionately. For example, with a 20-milligram plaque the time would be reduced to half an hour.

When the radium emanations are used the apparatus is similar, with the exception of the silver cup, which is omitted. The emanations are screened with 0.5 mm. silver tubing. The tubes are held in place by means of wax. The dosage remains the same as in the radium plaque, being 10 millicurie hours; tubes of between 10 and 20 millicurie giving the most consistent results.

The results with cataracts continue to be consistent with those described in our previous paper.

We have used the same applicator in other ocular diseases, as tuberculosis of the conjunctiva, vernal catarrh, and certain obscure conjunctival and corneal lesions. Most of these have shown a decided improvement.

In private practice we continue to use the radium plaque, but employ the emanations in the clinic. The results do not differ, whether the emanations or the plaque are applied.

In cataracts which have gone to the immature stage; in other words, where the vision has been reduced to .2, the method is not indicated. In several of the inquiries concerning the treatment for cataracts, the process had apparently gone to the immature or mature stage. Experience has shown that they respond poorly to the treatment. The best results are obtained in those cases which can be classified as incipient, and where the vision has not been reduced below 0.5. In checking up we find that after the radium treatment there is generally a change in the refraction.

This paper has been presented with the hope of thus stimulating more men to use radium, trusting to obtain a better knowledge of the results thru widespread application.

Cases must be carefully selected and the details of treatment strictly adhered to.

OCULAR CONDITIONS ASSOCIATED WITH ARTHRITIS DEFORMANS.

HARRY FRIEDENWALD, M.D., F.A.C.S.

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Altho ocular complications have been described as associated with rheumatism it is only of recent years that their connection with arthritis deformans has been fully recognized. This paper reports four cases and refers to the mention of similar cases in the literature. Read before the Ophthalmic Section of the Medical and Chirurgical Faculty of Maryland, March 9th, 1921.

Arthritic ophthalmia was a term much used by ophthalmic writers a hundred years ago. It embraced very varied conditions, as purulent conjunctivitis, iritis, glaucoma. Mackenzie[1] applied it to certain forms of iritis due to gout. Much confusion arose and has continued until recent times, because every variety of articular disease that was not clearly gout was described under the term of "rheumatism."

The extensive studies of Jonathan Hutchinson[2] embodied in his several papers on the "Eye Diseases in Gout and Rheumatism" suffer from this fact, as does likewise Nettleship's paper[3] on the "Frequency of Rheumatism and Syphilis" as causes of iritis. Out of a total of 71 cases he ascribed 30 to syphilis, 23 to arthritis.

"Scleritis, iritis and conjunctivitis have been described as complications of rheumatoid arthritis, but it is doubtful whether they are really manifestations of this disease. Their occurrence would suggest that a gonococcal infection is responsible for both the arthritic and the ocular lesions." This citation, taken from Allbutt and Rolleston's System,[4] shows a more generous consideration of the eye complications of arthritis deformans than is commonly to be found in the works dealing with this subject. Llewellyn Jones,[5] in his recent work on arthritis deformans, summarizes the eye complications in almost the same words. He also mentions a peculiar contraction of the fields of vision; which he attributes to vasomotor disturbances, because it is influenced by amyl nitrit. See also Beaumont.[6]

The voluminous studies on arthritis deformans by the "Committee for the Study of Special Diseases"[7] do not make mention of ocular complications.

Books dealing with the relation of ocular and systemic diseases likewise furnish scant information. Berger[8] has a chapter on "Trouble oculaires dans les affections des articulations"; but mentions nothing bearing on arthritis deformans; nor does he refer to this disease in his contribution to the Encyclopedie Francaise d'Ophtalmologie. Knies,[9] writing on "Chronic Rheumatism," says, that while this has been looked upon as the cause of the most varied diseases of the eye, this assumption holds good only for certain forms of uveitis, iritis, glaucoma and scleritis. Schmidt-Rimpler,[10] in Nothnagel's System, embraces all chronic cases under "chronic rheumatism" and refers to iritis, interstitial keratitis, scleritis, tenonitis and retrobulbar neuritis. Groenouw[11] devotes a chapter to the diseases of the articulations (and the muscles) and collects more than forty references bearing on the subject, reaching down to 1900; but not a single one dealing specially with arthritis deformans. Arnold Knapp,[12] in his "Medical Ophthalmology," does not mention arthritis deformans.

The pages of medical literature are filled with the subjects of gout and rheumatism and these conditions are constantly regarded as the causes of iritis, scleritis and many other ocular diseases. The causative relation between arthritis deformans and iritis is now generally recognized. It is accepted as a fact in our leading textbooks.[13-14] But the number of cases well studied and sifted, is not abundant. Gilbert[15] recently reported two typical cases. See also Junius'[16] "Rare Rheumatoid Affections with Ocular Disease."

In this paper the writer ventures to report conditions other than iritis met

with in association with typical arthritis deformans.

Case 1. Miss G. had been a sufferer from arthritis deformans since she was fifteen years old. In 1908, when she was thirty-eight, she was under the care of Dr. Baer at the Hopkins Hospital, and I am indebted to him for the following: Father's sister had rheumatism. Patient's general health good. Had measles, typhoid, no tonsillitis. Articular disease began in left shoulder, then left elbow and wrist, followed by ankles, knees and joints of right arm, and later hips. Had been in bed for one year. Never free from pain since first attack. Temperature 99.6°, pulse 120. B. P. 110/80. Patient sallow and pale. Exophthalmos, but no von Graefe sign. "Geographical tongue"; few crackles at apices of both lungs; heart clear; spleen enlarged. Almost all the joints of the extremities involved, with pain, crepitus and limitation of motion. Marked muscular atrophy; ulnar deflection of fingers.

Special note of Dr. Baer's: Great amount of atrophy of muscles of hand, with swelling in region of joints. Certain amount of villous changes in and about joints, with loss of some cartilages, causing grating. Hyperextension of distal phalangeal joints and atrophy. Marked dislocation of first and second fingers of right hand. Knees swollen and dislocated backwards, with increased lateral motion. No villi to be felt in knee joints. Elbows flexed and cannot be supinated: marked grating. Teeth bad. Tonsils and throat clear.

Blood: RBC. 4,160,000; WBC. 7,200; Hg. 8 25%; Polys. 75%.

Urine: Sp. Gr. 1015-1035. No sugar, albumin or casts.

Course in hospital. Ran fever to 100° in evenings, gradually subsiding to normal. Some relative tachycardia. Patient kept at rest. Joints baked Aspirin grs. x t.i.d. Gradual improvement. Discharged after four months.

I was called to see this patient December 7, 1911. Her general condition had been inflamed for several weeks. Both eyes presented a mild scleritis.

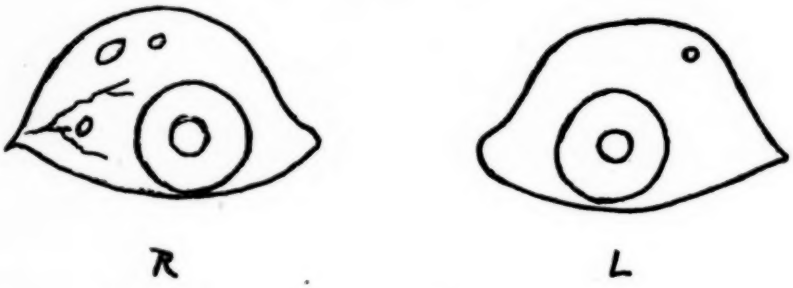

Fig. 1.—Spots of scleritis seen in arthritis deformans. Case I.

The eye-grounds were healthy and vision was unimpaired. Aspirin in 5-grain doses and dionin in 1% solution locally were ordered.

This condition continued with periods of improvement and of exacerbation. On April 5, 1912, I found both eyes still markedly congested in patches, with areas showing the characteristic purplish hue consequent upon scleritis. In addition, small, flat, yellowish, white masses were to be seen in the bulbar conjunctiva; there was but one in the left eye, some distance above the cornea; in the right eye there were several in the upper quadrant, and they were larger. They were but slightly prominent. (See Fig. 1.) These spots were apparently of the same nature as those that have been described as occurring in gouty scleritis, and regarded as deposits of uric acid.[17]

The patient was suffering much pain and was taking about 25 or 30 grains of aspirin daily. I saw the patient again in January, 1913, when she complained that she had severe pains in

her head from time to time, and at such times the eyes became congested and inflamed. At these times she took aspirin with relief. At the time of my visit the eyes were free from congestion, and showing only the purplish discoloration of the sclera.

The patient lived until February, 1920, when she died of myocardial degeneration. She had not been troubled with her eyes for several years.

Rohmer[18] regards scleritis as the expression of a diathesis which he calls "arthritism," and due to an exudate similar to the deposits in the articulations. The distinct deposits observed in this case are in accord with this view.

Case 2. Miss H. began to suffer with her joints in 1872, when she was thirteen years old. At first her feet swelled and she had difficulty in walking. Soon after, the knees became involved and became fixed in a flexed position. She has never been able to walk since that time, but after about a year spent in bed, her pain subsided and she was free from suffering for twenty-three years. About 1895 other joints became involved, from the shoulders to the finger joints. She was repeatedly examined most carefully without the discovery of any focus of infection. In 1915 she spent a week at one of our leading hospitals for examination, again without result. She had always enjoyed good health, barring the arthritis and several attacks of kidney colic, from which latter trouble she was finally relieved by an operation on the kidney about 1912.

My first examination of the eyes was May 13, 1915. For several weeks she had been annoyed by a sensation of grit, and during the past two days there had been pain in the left eye. I found a small superficial corneal ulcer, not infiltrated, about 1 or 1.5 mm. near the inner margin of the cornea. The eye was only moderately congested. Iodoform ointment was applied and the ulcer disappeared in a few days.

October 11, 1915, there was a fresh ulcer of the same kind near the inner lower margin of the same cornea, which took the same course. February 18, 1916, a similar ulcer near the outer lower margin, requiring about a week for its recovery. There were recurrences which I observed in March and again in April, 1917, October, 1918, April, 1919, and October, 1920, affecting the eyes indiscriminately, besides several attacks which I did not see. The duration varied from a couple of days to a week. The ulcers disappeared without leaving any trace. The patient, a very intelligent woman, is of the opinion that the ulcers appear when she "is not feeling well," when she "is run down." But it must be borne in mind that her "best condition" is one of considerable suffering, for there is scarcely an articulation in her entire body which is not involved in the pathologic process. The ulcers have all been of about the same size and have all been situated one or two mm. from the corneal margin. They are of the characteristic variety described as "small marginal ulcer," by Fuchs[19] and which he attributes to the "uratic diatheses." It should be specially noted that the patient does not suffer from any nasal trouble, not even a "cold," at the time of the corneal attacks, and there has never been any inflammation of the conjunctiva.

Case 3. Mrs. K. dates the onset of her arthritis deformans to the birth of a child when she was twenty-three years old. It began in the hands, gradually invaded the shoulders, legs and she soon became unable to walk. Her hands, arms and legs present the characteristic deformity.

She first consulted me in January, 1908, when she was forty-two years of age. She complained of inability to use her eyes. There was a marked chronic conjunctivitis, with masses of stringy mucus. The photophobia was so intense that it was impossible to make an ophthalmoscopic examination. Her vision was:

R. — 0.5⌒ — 1.5c. 160°=6/9.

L. — 1.5⌒ — 2.0c 15° = 6/12.

Dionin and hot boric acid applications were used. In November, 1911, I was called because the eyes had become very painful, and found ulcers near the lower margin in both corneae. The ulcers were superficial, crescentic in form, and concentric with the corneal

limbus, from which they were separated by a narrow band of healthy tissue. In the right eye the ulcer was 6 to 8 mm. in length, in the left 4 to 5 mm. and about 1 to 2 in width. Several weeks elapsed before the ulcers cleared up, leaving shallow depressions.

On January 24, 1912, a test of vision gave the following:

R. — 3.5 c. ax. 7°=20/24.

L. — 1.5⌒ — 2.5c. ax. 15° =20/30.

Both eyes were very irritated, and there was much thick stringy mucus. She was using a zinc collyrium. The patient was not seen again until recently. September 24, 1920, she reported that she had frequently had attacks of painful inflammation in both eyes, first in one then in the other, during the past eight or nine years. But in the intervals she had been able to read. This, however, she had been unable to do for six months.

Both eyes were found much congested and the photophobia was intense. The corneae are fairly clear, tho there are a number of maculae. The palpebral conjunctiva is very red and there are bits of threadlike mucus in both eyes. An ophthalmoscopic examination is impossible on account of the photophobia, but the ophthalmoscopic reflexes are clear. Vision with her distant glasses is R. 20/150, L., less Various collyria and ointments have been used with little relief.

In this case we have a persistent conjunctivitis with tendency to corneal involvement and with the development at one period of "superficial marginal ulcers" in both corneae.

The corneal affection in this case clearly belongs to the variety described as "catarrhal ulcers," and appears to be secondary to the persistent conjunctival inflammation.

Case 4. Mrs. S. enjoyed good health, barring her arthritis deformans, which began in 1909, when she was 61 years of age. At that time severe pains set in, in the knees, feet and soon after in the wrists. She has suffered pain more or less continually since that time. She was able to walk for some time but not for the past six years. The knees are flexed and fixed, and the hands and wrists show the typical deformity.

I first saw the patient in November, 1918. At that time there was no inflammation of the eyes nor had the patient complained of them in any way. The eye-grounds were healthy and the vision was good. On April 16, 1920, I was called because she was suffering discomfort in her left eye. I found the eye somewhat congested and an extensive denuded area along the lower edge of the cornea. An ointment containing iodoform and holocain was ordered. But the condition gradually became worse, and the pain increased to such a degree that she could get relief only by the help of morphia.

On May 4 the condition was that of a dense gray infiltrate at the lower margin of the cornea in the shape of a broad and intensified arcus senilis. Pain severe. Argyrol and atropin were being used. There appeared to be no tendency to extension, but the ulcer resisted treatment. The denuded area was stained by argyrol. May 7 a few posterior synechiae became evident.

The inflammation gradually abated; scarlet red ointment was then used; about the end of May the patient had recovered sufficiently to leave the city for her country home and had no further trouble with her eye.

I examined the eye on October 4, 1920, and found an extensive corneal opacity shaped like a hypopyon of 2 or 3 mm.; depth, but no other trouble. The eye-grounds were normal and sight was almost normal after correction of a marked inverse astigmatism (2 D). During the summer the patient has had several attacks of angina pectoris; but when last seen, in the fall, she was in her usual condition of health. The patient died January 18, 1921.

The corneal ulcer described in this case belongs to the variety of "superficial marginal ulcer" of Fuchs.[20]

Fuchs says interstitial keratitis was formerly regarded as rheumatic, until Hutchinson[21] showed its luetic basis. Hansell[22] in 1903 reported two cases of keratitis, one of the lattice-work variety, the other of the "superficial punctate" as "probably rheumatic in ori-

gin," but the history given does not substantiate this.

In 1905 Leartus Connor[23] published "Is Keratitis Ever Caused by Rheumatism?" He reported several cases and the results of an inquiry addressed to American oculists. There were records of a great variety of interstitial keratitis (46) and of superficial keratitis (13); among the latter four cases of marginal keratitis, one of which was observed by Connor in a case of "subacute rheumatism."

Arthritis deformans is now commonly regarded as a chronic infection. Osler[24] said: "This view is steadily gaining ground and the evidence suggests certain varieties of streptococci as the causal organism. The arthritis is secondary to a focus of infection somewhere. . . ."

The ocular complications described in the four cases narrated, scleritis in one, marginal ulcers in the other three, associated in one with a chronic and stubborn conjunctivitis, may be explained upon the basis of the view just described. Further observations are needed to make sure that these eye conditions are dependent on the constitutional condition and not coincident. For the present we must admit that we have not solved the problem, and may still say with Mackenzie, "I must confess that the nature of arthritic ophthalmia is unknown to me."

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EXTREME HYPERMETROPIA.

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A case of 17 D. hyperopia in each eye is here reported, with reference to some of the similar cases found in the literature. The report was presented to the Louisville Eye and Ear Society, February 9th, 1921.

The infrequency of excessive hypermetropia warrants the report of the following case of hypermetropia of 17 D.

Miss H., age 38, consulted me in November, 1920, with the history of having worn glasses for poor vision since her ninth year; that she had to change her lenses frequently until 10 years ago, and that since then she has worn the same glasses with comfort. In the last few months she had noticed more difficulty in reading and sewing, and had acquired the habit of holding her glasses four inches from her eyes or dropping them to near the tip of the nose to make objects clear. She had also had occasional attacks of nausea, but gave no history of headache or other symptoms of asthenopia. Vision had always been defective but the patient has been able to attend school and secure a fair education and to do a moderate amount of reading and sewing. There was no history of squint. Patient was wearing for both eyes, + 17 D. for near and far use.

Both parents of the patient have good eyes and began wearing reading glasses when past 40 years. There are two brothers and three sisters, only one of whom is wearing glasses (1.5 D. hypermetropia absolute). One sister is blind, the result of optic atrophy.

Examination of patient showed no abnormality of face, with the possible exception of an unusual prominence of the frontal eminences. The interpalpebral aperture seemed normal. In lifting the lids two very small eyeballs presented. Being uniformly small, they gave the impression of doll eyes. Corneal diameter measured 11 mm. There was no abnormality of iris or choroid. The optic nerve, so far as could be determined, was also normal. Retinoscopy, altho not very satisfactory, read about 17 D. hypermetropia. Ophthalmometer showed corneal curve greatest in horizontal meridian (0.5 D. against the rule, axis 180°-90°).

Subjective examination: R. Fingers at four feet, improved with + 17.0 D. sphere to 20/100. No improvement with cylinders. L. Fingers at 8 feet with +17.0 D. With both eyes she was able to read Jaeger No. 5 from 15 to 22 cm. with +19.0 D.

Altho it is generally understood that there are three types of typical hypermetropria, those of a low, of a moderate and of a high degree—a sharp line of division based upon the amount of refractive errors has not been made. Landolt[1] in his classic work on Refraction and Accommodation of the Eye (1886) made a division of the hypermetropic cases into three classes; which he based upon the formation of the head and face, rather than upon the degree of refractive error present. He pointed out that in the cases of a low degree the arrest of facial development is scarcely perceptible, and that the individuals nearly all have normal acuteness of vision and range of accommodation.

The cases of a medium degree are easily recognizable by the conformation of the cranium and face. The face appears flattened, especially in the region of the root of the nose, the forehead, the orbital borders and the zygomatic processes. The eyes in this class of cases are usually small, the development being more especially retarded in the anteroposterior diameter, causing an axial hypermetropia. The visual acuteness in the cases of moderate hypermetropia may be perfect, but in a large percentage of cases the vision is somewhat defective. There is an insufficiency of accommodation for near objects which makes itself more felt as the degree of hypermetropia is higher. It is in this class of cases that the hypermetropia is frequently associated with convergent squint, owing to the constant effort at accommodation and convergence.

Landolt speaks of the imprint of the arrest of development that nearly all

individuals with high degrees of hypermetropia bear. The eyeball is reduced in size in all of its proportions, while the retarded development of the face is in keeping with the underdevelopment of the eye itself. The eyes resemble those cases of microphthalmus associated with coloboma of the iris or choroid, and of congenital atrophy of the nerve, with little or no vision.

Vision in the cases of high degree hypermetropia is always subnormal. An unlooked for feature of the cases is the underdevelopment of the ciliary muscles and consequent restricted range of accommodation, rather than an overdevelopment as might be expected. This underdevelopment of accommodation has been explained in a realization on the part of the individual of his inability to accommodate sufficiently to overcome the high degree of ametropia and a consequent lack of effort.

This absence of accommodative efforts accounts for the infrequency of convergent squint, another unlooked for feature of these cases. Convergent squint is very exceptional in cases of excessive hypermetropia; in fact these cases, especially those in which a high degree of amblyopia prevails, are not infrequently associated with divergence. They not only resemble cases of high myopia in this particular but also in that the individual holds print very close in reading. As the retinal images are very small in excessive hypermetropia, patients bring objects very close to the eye in order to obtain larger tho less distinct retinal images.

Cases of extreme hypermetropia are quite uncommon as is evidenced in the infrequency of case reports of the kind. My records contain but two other cases of the kind, one of 10 D. and one of 12 D. hypermetropia. In a paper read before the Ophthalmological Society of Heidelberg in 1906, Leber[2] called attention to the rarity of the condition and cited from his own records 8000 cases of refraction, among which hypermetropia of more than 11 D. was observed but four times.

High degree cases were noted even in Donders' time, for he cites[3] a case in which glasses of about 21 D. were prescribed for distance. From that time until the present, case reports of extreme hypermetropia have appeared from time to time, among them one of 24 D. hypermetropia reported by Seabrook.[4]

Edw. Stieren[5] reported a case occurring in a feeble-minded boy of 15 years, who had a microphthalmus with no vision in one eye, and a hypermetropia of 21 D. with imperfect vision in the other. Similar cases with lower degrees of ametropia were reported by Bishop Harman[6] of 18 D. Chavasse[7] of 18 D., Clausen[8] of 15 D., and Lafon[9] of 15 D.

Reports seem to indicate that several members of a family frequently have similar high degree of ametropia. J. A. Wilson[10] reported three children among five of a family in which one had a manifest hypermetropia, right 14 D., left 16 D.; another right 10 D., left 12 D. and another right 8 D., left 9 D. He also cites two cases in one family, one with 12 D., the other with 9 D. hypermetropia.

The observation has been made that refractive errors frequently correspond in kind and degree to the degree and kind of ametropia of the parent—in fact that like errors extend thru several generations. As an illustration, may be mentioned a case reported by Dodd[11] of a father with hypermetropia of 15 D. whose son had an absolute hypermetropia of 14 D.

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OBJECTIVE AND SUBJECTIVE TREMORS AS FUNCTIONAL DISORDERS DUE TO EYESTRAIN.*

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Tremors demonstrable to sight and touch, "objective," are frequently due to eyestrain. Less frequent are peculiar sensations of quivering or trembling, not objectively demonstrable, but "subjective." A table of cases illustrates the symptoms described and results obtained by correcting errors of refraction.

Tremors, as other symptoms due to eyestrain, find their pathologic explanation on anatomic grounds. Of the twelve pairs of nerves, the second, third, fourth, fifth and sixth, go in whole or part to supply the eye, besides the ophthalmic division of the great sympathetic nervous system. The two great gangliated cords extending the whole length of the vertebral column are abundantly connected thru afferent and efferent nerve fibers with the cranial and spinal nervous systems. Thru the ganglia and plexuses the sympathetic relations between the different organs are maintained, and thru it the control of the vasomotor, trophic and secretory activities of the viscera as well as of the involuntary muscles is regulated.

We can, therefore, easily understand the most unexpected results of continued eyestrain and the frequently surprising cures effected by proper refraction. The subject of tremors as due to eyestrain has so far been almost entirely neglected by the medical profession. Text-books on general medicine, nervous diseases and refraction do not mention it. Not even S. Stephenson in his careful monograph on eyestrain seems to have heard of it. The only reference that tremors may be due to eyestrain, I find in the following few sentences quoted from letters of his patients by Dr. Geo. M. Gould in the 6th volume of his Biographic Clinics:

"I even note that such an unimportant matter as a nervous trembling of the hands, which has made writing and sewing difficult for many years, had entirely disappeared."

"After wearing my old glasses for six weeks my hands began to tremble. I remember this because I had a sewing girl and could not help her because I was unable to thread or set a needle. After a while I began to shake all over and could not take much exercise. Walking did not seem to trouble me, tho the flesh quivered all over my body most of the time."

"In passing it may be noted that the tremors of many kinds and afflicting many patients are often, in essential nature, probably an excessive and unregulated overflow of innervation to the bodily muscles."

OBJECTIVE TREMORS.

These tremors of the voluntary muscles are absolutely visible and demonstrable to touch. I therefore wish to call them *objective tremors* to distinguish them from another class of cases, to my knowledge never before described, which gives the history of a peculiar sensation that is felt as a trembling of the smooth muscles, in the viscera and also, tho rarely, in the voluntary muscles. This trembling is *not visible nor demonstrable to the touch,* and is purely a sensation. I have therefore called this sensation of trembling *subjective tremors.* As I said, it is not a tremor, but bears only a sensory resemblance to it. It is comparable to a polar light or a sunset simulating the appearance of a distant actual conflagration.

The exact localization of the centers which when irritated cause these tremors, is as yet theoretic. While the objective tremors are undoubtedly caused by the stimulation of the cranial motor centers, the latter play none or only a secondary role in the causation of subjective tremors. The localization of subjective tremor centers is, in all probability, in the sympathetic ganglia or plexuses, supplying the smooth muscle fibers, especially those of the arterioles. It is the spasmodic

*Read before the Maimonides Medical Society of Detroit, Mich.

contractions and dilations of the latter, not noticeable by touch nor able to be stopped by direct pressure, which in all probability produce the sensation of quivering in subjective tremors.

Objective tremors of eyestrain origin never occur without other accompanying symptoms. They are either slow or moderate, fine or coarse, and usually volitional. They are never organic, but always functional. The parts most frequently involved are the hands and arms, next in frequency are the legs, and occasionally other sets of muscles as the chin, tongue, cheeks, spine muscles and so on. The tremors are as a rule so slight that they are easily overlooked and never complained of except on direct inquiry. They are rather more common in women than in men (359 to 288) and occur at the age of 20 to 60.

The results of refraction in the elimination of this annoying symptom are very gratifying, more so in women than in men. Of the 647 cases there were:

	Reported	Improved or Cured	No Improvement
Men 288	126	109	17
Women ..359	172	154	18

Therefore refraction can be credited with beneficially influencing functional objective tremors in 85% of the cases in men and 90% in women.

CASE REPORTS.

I shall cite only a few of the many cases of objective tremors, which the results of refraction prove to have been caused by eyestrain.

1. City official, 43 years of age, occasional tremors of the hands, bad enough to prevent him from writing during the attacks, lasting about ten minutes.
2. Office clerk, 20 years of age, tremors of whole body, with attacks of headache.
3. Laborer, 29 years of age, tremors of hands since youth.
4. Machinist, 34 years of age, tremors of the legs and spine muscles, variable in location and duration. Tremors of left upper lid when reading.
5. Clerk, 31 years, occasional tremors of hands, also tremors of the whole body lasting five or ten minutes, accompanied by chills.

All of these cases reported perfect recoveries.

SUBJECTIVE TREMORS.

Of greater interest, from a medical standpoint at least, are the cases suffering from subjective tremors. During the last six years I was able to collect only 92 cases, which would be about two or three per cent of all my cases seen during that length of time. The women were seven times more subject to that peculiar condition than the men (81 to 11.) The diagnosis is simple and the prognosis favorable.

Of the 92 cases, I saw again, some time after refraction, three men and forty-one women. All of them recovered except one woman patient.

The ages of the subjective tremor patients were the same as for objective tremors, anywhere from 20 to 60. The age limit of 60 is explainable by the fact that as the accommodative efforts cease, the eyestrain symptoms also disappear. The attacks last anywhere from a few seconds to two or three days, recurring at indefinite intervals. Excitement and fears invariably produce a recurrence of the attacks. The first attacks usually frighten the patients, but after getting more or less used to them, they are complained of as only annoying. Subjective tremors are absolutely painless and may or may not be accompanied by objective tremors.

As there is no organic lesion of any kind in subjective tremors and the irritation of the nerve centers probably not as severe as in objective tremors, the results are naturally more favorable.

As this is the first report given to the medical profession on subjective tremors, I take the liberty to include the records of my cases, as far as this symptom is concerned. I have tried to use, wherever possible, the exact descriptions given by the patients themselves.

Table I. Men Who Did Not Subsequently Report.

No.	Age	Occupation	
1	45	Physician	Objective tremors of hands. Subjective tremors in chest.
2	47	Physician	Objective tremors of hands and body. Subjective tremors in chest and abdomen.
3	44	Laborer	Subjective tremors in chest.
4	25	Watchman	Objective tremors of hands and whole body. Subjective tremors in chest, arms, and muscles, especially when going to bed. "Tremors not visible." "Takes twenty minutes to get over it, returning next night, sometimes not for a week."
5	38	Carpenter	Subjective tremors in head.
6	30	Dealer	Subjective tremors, precordial.
7	32	Merchant	Subjective tremors in legs.
8	23	Workman	Subjective tremors in stomach, on excitement, lasting one or two minutes. The feeling was annoying but not terrifying. On Sundays or in periods of relaxation would not be bothered.

Table II. Men Who Reported the Result.

No.	Age	Occupation	Results of Refraction	
1	33	Machinist	Recovered	Subjective tremors in chest.
2	21	Druggist	Recovered	Subjective tremors in chest, daily, mornings only, lasting to 11 or 12 noon, seldom in the afternoon. Began last year.
3	29	Toolmkr.	Recovered	"Quivering, not visible, in body, chest and abdomen, but visible in hands" (objective tremors). It would come on every two or three days, mostly after hard work, lasting about one-half hour two or three times a day. If he sat down and relaxed it would ease up. It all lasted three years.

Table III. Women Who Did Not Report.

No.	Age	Occupation	
1	22	Bookk'pr.	"Trembles and shakes inwardly terribly, but no one can see it." When excited, jerks, twists and jumps at the least noise. Objective tremors of hands.
2	38	Bookk'pr.	Objective tremors of hands and legs, quite often. "Trembling inside" in chest.
3	27	Wife	Tremors of whole body. During the "shaking" she feels quite warm; she does not feel very ill but uncomfortable. "She really does not shake but feels as if she were shaking."
4	25	Wife	"Trembly inside," with hot flushes once a month lasting three or four days.
5	25	Wife	Objective tremors of hands. "Inside trembling in stomach."
6	21	Office	Objective tremors of hands and body. "Inside trembling in whole body."
7	29	Wife	Objective tremors of hands and body. "Inside trembling" in chest and abdomen.
8	20	Wife	Objective tremors of hands and body, at times. Subjective tremors every few days.
9	31	Wife	Objective tremors of hands, and subjective tremors in chest.
10	26	Bookk'pr.	Objective tremors of hands and body lasting one-half hour. Subjective tremors in abdomen.

11	21	Switchb'rd.	Objective tremors and trembling lasting one to two hours and subjective tremors in abdomen before falling asleep.
12	49	Wife	Subjective tremors in abdomen.
13	25	Teacher	Subjective tremors in chest for last two years.
14	34	Wife	Subjective tremors in chest when talking much or when excited, lasts only a few seconds. She then presses her hand to her heart to quiet it, as she says. This subjective tremor is not terrifying to her, but just uncomfortable.
15	34	Wife	Subjective tremors in chest. Rarely. Does not feel very ill, but feels relieved when they pass.
16	22	Stenog.	"It seems to tremble inside of her chest. It feels as if she were all cold inside and the voice is then trembling." Lasts less than half an hour, recurring on excitement about once a week. Not terrifying but annoying.
17	37	Wife	Subjective tremors in stomach when lying down, especially after taking a meal. Sensation usually lasts about two or three hours on an empty stomach, otherwise very much longer. It occurs nearly daily, especially when tired.
18	54	Wife	Subjective tremors in back and in muscles. "Quivery feeling."
19	45	Wife	Subjective tremors in stomach especially at the time of menstruation.
20	34	Wife	"Trembly feeling" in stomach continuously for four weeks. This sensation makes her exceedingly nervous. (Has had that feeling since her husband died four years ago, but lately it is getting worse.)
21	40	Wife	Subjective tremors in chest about once a month. Scares her. She has to induce vomiting to be relieved.
22	29	Wife	Objective tremors of hands. Subjective tremors of chest. Annoying but not terrifying. Lasting one-half hour.
23	36	Officew'k'r.	Objective tremors of hands and subjective tremors in abdomen. "This sensation makes her want to run away from herself and makes her excessively nervous"; lasting from four to six hours. If she lies down, closes her eyes and takes a strong cup of tea, she can overcome it in two to three hours. If anyone excites her the subjective tremors would recur. Usually recurs most severely before menses. Lately more or less constant, accompanied by vertigo.
24	36	Wife	Subjective tremors in chest when frightened.
25	32	Wife	Subjective tremors in chest and abdomen, continuous.
26	45	Wife	Subjective tremors in hands and body for the last two years; almost daily, lasting about one half hour; then they stop and return again either the same or next day. Vertigo with tremors which necessitates lying down until she gets over it.
27	42	Wife	Subjective tremors in abdomen, chest, arms and legs, all at the same time and lasting an hour, usually starting early in the morning. Does not have to lie down but "works it off."
28	33	Wife	Subjective tremors in abdomen and in back muscles while in bed, lasting a few hours. Once or twice a week during the last year.
29	21	Wife	Objective tremors of the body. Short quivering sensations in stomach every half minute, attacks lasting two or three days.
30	35	Wife	Objective tremors of right hand; subjective tremors in stomach on excitement. "Chattering of teeth."
31	24	Wife	Subjective tremors in abdomen.
32	18	Clerk	Subjective tremors in stomach, when excited or scared, lasting one-half to one hour; recurs occasionally as many as ten times a day. "It feels nasty."
33	38	Wife	Subjective tremors in chest (shortly after eating dry food).
34	38	Wife	Subjective tremors in stomach.
35	18	Clerk	Subjective tremors in stomach. Occasionally lasting two or three days, "passing off without doing anything."
36	49	Wife	Internal tremors in chest, legs and body at night. "Not visible"
37	23	Wife	Subjective tremors of stomach when excited, lasting a minute or two.
38	46	Saleslady	Subjective tremors in abdomen.
39	31	Wife	Objective tremors of hands. Subjective tremors in left inguinal region about three times a week lasting a minute or two.
40	46	Wife	"Trembly feeling in whole body, not in any particular part. Feels as if she were frightened. Body does not shake but it feels like it." Recurs on and off lasting about one-half hour. "Relieved on sitting down and quieting herself." Attacks during last three or four years.

Table IV. Women Who Reported.

No.	Age	Occupation	Results of Refraction	
1	44	Wife	Recovered	During migraine attacks suffers from objective volitional tremors of arms and legs. "Inside trembling" in whole body accompanied by palpitation, lasting one-half hour, about once a week. Has to lie down during attacks.
2	60	Wife	Recovered	"Shaking inside" generally in the morning, only once in a while.
3	34	Office clerk	Recovered	"Trembling inside" every few days, lasting a few hours.
4	40	Wife	Recovered	Objective tremors of hands and body. "Inside trembling" in chest.
5	20	Wife	Recovered	Objective tremors of hands, legs and body. Subjective tremors in abdomen.
6	28	Wife	Recovered	Objective tremors of hands. Subjective tremors in chest.
7	37	Wife	Recovered	Objective tremors of hands and body. Subjective tremors in abdomen.
8	44	Wife	Recovered	Subjective tremors in region of stomach.
9	25	Wife	Recovered	Objective tremors of hands and body. Subjective tremors in chest, with sinking spells, especially when using eyes for near work, recurring two or three times a day, lasting one-half hour. Terrifying.
10	28	Wife	Not recovered	Subjective tremors in abdomen (not cured in seven weeks).
11	32	Wife	Recovered	Objective tremors of hands. Subjective tremors in chest.
12	42	Wife	Recovered	Subjective tremors in legs. Described as a "whirling feeling," something as if the head were confused; feeling was constant all day long. Felt better if she laid down, but could keep going. Legs felt at times as if they would give way under her. Sensation only annoying.
13	37	Wife	Recovered	Subjective tremors in abdomen, chest and knees; any little over-doing would bring it on; lasted about ten minutes and "made her weak," recurring two or three times a day. "A peculiar sensation that gives a wobbly feeling as if everything inside one was detached, an uncanny feeling."
14	58	Wife	Recovered	Subjective tremors in chest when she was "awfully nervous" a few times a day, lasting a few seconds only. Only annoying.
15	33	Wife	Recovered	Subjective tremors in stomach and arms. The sensation "makes her weak"; lasts one hour until she falls asleep; nearly every day.
16	31	Wife	Recovered	Subjective tremors in chest and abdomen. "It does not feel cold inside." Tremors last about five minutes; happens every day.
17	45	Wife	Recovered	Subjective tremors in stomach, nearly continuous, with frequent interruptions. Attacks last about one hour. While the sensation did not scare her it was so annoying that it nearly drove her frantic. Sensation felt during daytime and sleepless nights.
18	38	Wife	Improved	Subjective tremors in chest when tired and nervous, lasting 15 or 20 minutes, especially after supper. Three or four times a week. At times scares her and "feels as if her heart dropped down into her abdomen." Reports now about once a week "heart does not feel to drop in the abdomen any more."
19	32	Wife	Improved	Subjective tremors in chest and abdomen.

No.	Age	Occupation	Results of Refraction	
20	38	Wife	Recovered	Subjective tremors in stomach.
21	26	Wife	Recovered	Subjective tremors in heart and lungs on excitement.
22	41	Wife	Recovered	Subjective tremors in chest and abdomen when excited, lasting about ten or fifteen minutes.
23	32	Wife	Recovered	Objective tremors of hands and body. Subjective tremors in stomach when moving and working.
24	27	Wife	Improved	Feels "repeated motions in abdomen and chest." Also objective tremors of hands and legs.
25	26	Wife	Recovered	Subjective tremors in left side of abdomen and left inguinal region, a quivering lasting a few minutes, "most frequent at bedtime but not during the night."
26	39	Wife	Recovered	Subjective tremors in whole body, but "rarely and not visible," always about two weeks after menstruation.
27	25	Musician	Improved	Objective tremors of the fingers. Subjective tremors in the abdomen.
28	32	Wife	Recovered	Objective tremors of hands when tired. "Quiverings" in stomach recurring a few times a week, lasting one hour; relieved by resting.
29	29	Wife	Recovered	Subjective tremors in abdomen.
30	26	Stenog.	Recovered	Subjective tremors in abdomen.
31	42	Wife	Improved	Objective tremors of hands and body. Subjective tremors in stomach when excited, lasting from a few to twenty minutes. Reported greatly improved.
32	31	Wife	Recovered	Subjective tremors in arms and whole body, especially in chest and abdomen; "feels as if machinery moved and wiggled the parts." She cannot see the tremors nor feel them by touch. Often she would press her arms tightly during the subjective tremors without influencing the sensation in the least. These sensations occur when excited, as a rule daily, and last about one-half to one hour. During the attack she feels as if she had to move her bowels, but only rarely can she really defecate. During the attacks she is very restless, but does not lie down. Suffered from subjective tremors last four years. Reported within two months after refraction a perfect recovery.
33	24	Wife	Recovered	Objective tremors of hands and subjective tremors in the "heart," when excited, not of the pectoral muscles but below the ribs. She is sure there is no palpitation or actual tremor. Attacks last for days with frequent intermissions. In the beginning she thought she would die of it, now only annoying. Recovered within one week after atropinization of her eyes.
34	49	Wife	Recovered	"Shakes inwardly" in stomach, lasting occasionally all day. Does not scare her, just annoying. She had these tremors for the last three years.
35	39	Wife	Improved	Subjective tremors in stomach every few minutes.
36	24	Wife	Recovered	Subjective tremors in chest when excited lasting a few minutes.
37	37	Wife	Recovered	Subjective tremors in chest.
38	35	Wife	Recovered	Wakens frequently with subjective tremors of the whole body, especially the abdomen. Jerking (spasm) of abdominal muscles during the subjective tremor in stomach.
39	27	Wife	Recovered	Subjective tremors in chest. "Chattering of teeth." Scared. "Thought that she would never see her mother again." Attacks lasting about one-half hour. Recovered entirely.
40	20	Wife	Recovered	Subjective tremors in abdomen.
41	24	Wife	Recovered	Subjective tremors in chest. "Quaky feeling."

CONCLUSIONS. — It seems incredible that such a frequent eyestrain symptom as simple functional tremors has not as yet found its way in the medical literature, more so as it is so easily proved to be due to uncorrected anomalies of the refractive system.

It is also the first time the description of subjective tremors is given to the medical profession. The pathologic explanation is to be looked for in the overstimulation of nerve centers of the eye, especially of the sympathetic system.

Finally I wish to explain the rather large number of cases I reported. My method of taking the anamnesis explains it. I ask all patients presenting themselves to me for refraction about the presence or absence of any eyestrain symptom known to me and I record the answers in an easily reviewable manner. Every patient is asked to return to report the results of the refraction. About half of the patients comply with the request. The results are also entered in the same records. In this way I am not only told about symptoms which the patients never would have mentioned of their own accord because they considered them unimportant and irrelevant, but I am enabled mathematically to compile the results of hundreds of cases where otherwise I would have had only vague impressions.

Rare symptoms usually remain rare, because we take it for granted that they are such. Systematic and painstaking anamnesis will soon reveal to the astonished practitioner that they are more common than he may have imagined them to be. Besides unexpectedly satisfactory results in diagnosis or treatment are a more than ample reward for the trouble he may have taken in eliciting and recording detailed histories of his patient's symptoms, and of a conscientious recording of the results of his endeavors.

NOTES, CASES AND INSTRUMENTS

BLOCKING OF THE FACIAL NERVE IN CATARACT OPERATIONS.

MAJOR ROBERT E. WRIGHT, M.B.,

MADRAS, S. INDIA.

In cataract operations the orbicularis palpebrarum has always to be reckoned with. The patient who cannot, or will not, control this muscle is always a source of anxiety to the eye surgeon. In the Clinic of the Government Ophthalmic Hospital, at Madras, the term "squeezer" is used to indicate a patient who continuously or intermittently and without warning, "screws up" the eyes with force. Such patients usually give other evidences of trouble to come.

It is almost unnecessary to inquire of one's assistants if the subject is a "squeezer," for on approaching the operating table the surgeon may deduce from signs visual and auditory that the patient is likely to give trouble. Almost invariably a "squeezer" either mutters prayers under the breath, grinds the teeth, or keeps the great toes crossed. Such is the state of apprehension in some such cases that on the slightest touch the eye closes up like an oyster. These "prayer mutterers," "tooth-grinders" and "toe-crossers," are probably common to all Ophthalmic Clinics in India, and constitute a source of annoyance as well as anxious care to operator and assistant unless a general anesthetic be administered. The latter practice has never been adopted in Madras chiefly because of the amount of time which it takes up. As it was felt that the "squeezer" got more than his share of valuable time, even without a general anesthetic.

It was decided in the month of June, 1920, to try the effect of partially blocking the facial nerve before such patients were brought into the theatre, thereby putting the orbicularis temporarily out of action. It was determined to do this with the local anesthetic in ordinary use, namely 2% novocain. The injection was given five minutes before the patient came on the table. The needle was entered over the center of the zygoma and following the line of the latter was pushed to the pinna. As it was withdrawn the infiltration was effected. The needle was then turned and pushed in the opposite direction but in the same line, to a point approximately below the center of the eye. The injection was given on withdrawal as before.

This gave an absolutely flaccid circumorbital musculature in the trial cases, and so this method was followed thruout. Up to date one hundred "squeezers" have been dealt with in this way. In one case flaccidity was not obtained, and the patient was able to excercise considerable pressure, it is difficult to understand why. In several cases muscular action was apparently exercised by the nasal muscles and the corrugator on the side of the injection in association with contraction of the orbicularis of the opposite side. There is no reason why a more complete paralysis should not be obtained in such cases by extending the anterior injection to the side of the nose and giving another over the glabella.

The actual position of the infiltration described above was adopted before looking up the literature on this subject. Subsequently the method of Van Lint as described in the Ophthalmoscope for 1914 was noted. The latter seemed practically the same as the procedure which we had adopted, and did not appear to have any special advantages over it, so no change was made in technic. Recently Villard has described a method of obtaining temporary paralysis of the lids, and abstracts of his article have appeared in Ophthalmic Literature for June, 1920, and British Journal of Ophthalmology for November, 1920. Here also the idea is the same, but the detail slightly different.

The actual method does not appear to matter very much, provided that one keeps the infiltration away from the lids. Novocain would appear to be preferable to cocain. I do not wish to draw attention to a difference in meth-

od to those advocated by the above authors, but rather to support their principle.

The following conclusions have been arrived at: The method saves time, puts the operator and his assistants more at ease and facilitates the operation. It does not complicate the after treatment in any way as the lids are not interfered with. It does not appear to affect the patient adversely. After a fair trial the procedure has been adopted as a routine. Dr. K. Koman Nayar, who assisted at all the operations, is satisfied that the method is of value. I have to thank Mr. K. Pillay for carrying out the injections and collecting the cases.

THE RELEASE OF IRITIC ADHESIONS TO THE ANTERIOR CAPSULE OF THE LENS BY SUCTION PUMP MASSAGE.

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SEATTLE, WN.

Read before the Puget Sound Academy of Ophthalmology and Oto-Laryngology, Seattle, Wash., February 28, 1921.

For possibly two decades I have occasionally resorted to a procedure for the relief of posterior synechiae, which has not, to my knowledge, as yet been recorded, tho its rationale must be evident to the thinking practitioner of ophthalmology.

Owing to the better education of the general practitioner in diagnosis, as well as the discriminating discernment of the public in applying earlier to the specialist, direct, for the treatment of eye affections, fewer cases, in proportion to those of previous decades are found. Of improperly treated iritis, in recent years, in comparatively few well treated cases do adhesions of the iris result, for the rule of keeping the pupil open first, last and all the time during the course of this disease, or rather syndrome of disease, is well known and atropinization is rigidly followed out; whereupon the patient recovers with a full functioning iris and a pupil freely responsive to light and accommodation.

But we all see cases where application for treatment has not been soon enough, where atropin has not been used sufficiently and where adhesions have occurred which do not break way to intensive cycloplegia. In these it is well to endeavor to secure a round pupil, if only as an evidence of thoro and proper treatment. It is well known that eyes with a few iritic adhesions may not ever have another inflammatory attack, and that these synechiae do not particularly predispose to a recurrence or to secondary glaucoma, providing that there be sufficient drainage from the posterior to the anterior chambers. Therefore, operations for the relief of such adhesions, as were sometimes practiced in the past, are not alone unnecessary, but it was found that patients were subjected to a great risk of producing secondary cataract, and even when successful they accomplished no appreciable good.

I have found, in many cases—the number of which is immaterial and the

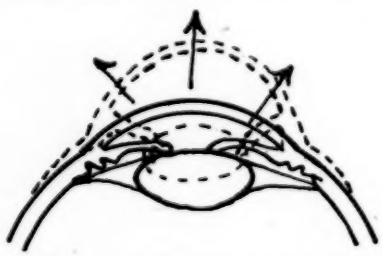

Fig. 1.—Effect of suction on anterior segment of eyeball shown in broken lines. Solid lines indicate normal position of part. Arrows show direction of force tending to burst adhesion.

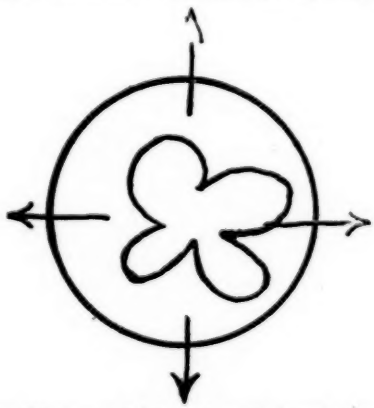

Fig. 2.—Diagram of iris and pupil bound down by posterior synechiae. Arrows indicate directions of force tending to set loose the adhesions.

report of which in detail would be inconsequential—that forcible massage of the eye by the suction pump breaks up these adhesions, and results in a free pupil. On a number of occasions I have reported the results of forcible massage in the treatment of embolism of the retinal vessels, in which the blood clot impacted in the artery was temporarily or permanently dislodged, with resultant return of vision.* This idea led me to try to break iritic adhesions by the same procedure and, in proper cases, it is eminently successful.

We use the Pynchon pump on the Victor electric apparatus, with the regulation cups.

I had a large size modification made of this, by which greater force may be obtained, which I believe is commonly sold with the machine. Suction and release with as long a movement of the piston as possible, in order to pull the eye in and out of its socket as far as can be, gives the best results.

The suction and release occurs at the rate of about 150 times a minute, is used for about one-half minute, the eye looked at and if no evidence of hemorrhages in the anterior chamber be found, used again for about a minute, the eye examined again and repeated for about one minute. On the next day the treatment may be given again if necessary, but in many cases the adhesions come away, leaving some of the pigment layer of the iris on the anterior capsule. The pupil becomes round and in an hour or so is found to be fully dilated under the influence of atropine.

There have never been any evil results, even when hyphemia has occurred. I would, however, hesitate to use it when there is evidence of implication of the ciliary body and the choroid, i. e., when there is minus tension, for the fear of producing a detachment of the retina or choroid, or intraocular hemorrhage. However, I have never had these accidents happen, even under the most strenuous treatment, such as has been given in digital and suction pump massage, as used for embolism of the central artery or in numerous cases of glaucoma and in optic nerve atrophy.

The eyeball is quite resilient and, under the effects of external pressure, may be dented in or forced back into its socket and by suction pulled forward, the cornea drawn out and the shape of the globe temporarily changed. The cornea, being more elastic than the sclera, is more changed and pulled away from its base, thereby drawing the ciliary body and iris away from the lens, the lines of force being not only directly forward, but to one side as well. Hence, if the iris be attached at any part to the lens, the force tends to tear it away and thus relieve the adhesion.

*(Annals of Ophthalmology, October, 1901; American Journal of Ophthalmology, January, 1906; American Journal of Ophthalmology, July, 1920.)

THE PROPER TREATMENT FOR ACUTE SUPPURATIVE DACRYOCYSTITIS.

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ST. LOUIS.

From time immemorial the authors of ophthalmic text-books have told their readers how to treat acute suppurative dacryocystitis; and have divided the subject (treatment) into two parts: 1, If seen early, use abortive measures; and 2, if seen later, promote suppuration.

Let us discuss these phases of the subject. A. Abortive measures are supposed to include expression of the contents of the diseased lacrimal sac, the syringing of the lacrimal drainage apparatus with any one of numerous solutions varying from sterile water to strong antiseptics, the application of iced compresses to the region of the sac, appropriate intranasal treatment, rest, and the employment of agents to promote elimination via the intestinal tract. This sounds good theoretically; but never has a patient with this disease come under my care at a period sufficiently early to give the above measures any curative (or abortive) value.

B. If the patient is seen too late for the surgeon to employ the above men-

tioned measures, then we are to use hot fomentations, with anodynes, etc., until such time as fluctuation is present. The abscess is then to be opened and, later, probes are to be employed. (So say many of the books.)

The writer contends that such advice is wrong; that the accepted method of treatment is illogical, and that it leads to needless suffering and to unnecessary tissue necrosis. The writer has adopted the method of treatment which was used in the following case.

Mrs., aged 40 years, a strong, healthy woman, who had suffered from "catarrh" and had shown right-sided epiphora for two years, came under the writer's care on the forenoon of February 7, 1921. For 48 hours she had shown the usual signs of an acute inflammation of the right lacrimal sac. She had passed a sleepless night. A small, hard brawny swelling was present at the region of the inner canthus.

At 5 P. M. of the same day, *under general anesthesia,* the following was done: The upper canaliculus was cut, the knife being carried into and beyond the sac. A Weber dilator was then passed thru the strictured lacrimo-nasal duct. The withdrawal of the instrument was followed by the escape of a few drops of thick creamy pus. A No. 9 Theobald probe was then passed thru the duct, and its presence in the nose was verified by touching it with another probe passed intranasally. Relief of pain was almost immediate. She left the hospital on the second day. On the third day, and also on the fifth day, a modified Bowman probe (No. 8) was passed. Since the sixth day there has been no discharge from the diseased area.

Modern surgeons believe in evacuating abscesses at the earliest possible period, and often exploratory incisions are made when the presence of pus is suspected. Such incisions, even if pus be not found, are beneficial. They relieve pain and lessen the tension of inflamed tissues. Why should dacryocystitis be an exception to the rule? The plan of treatment stated above has been followed by the writer for several years, with satisfactory results.

A NEW OPERATION FOR THE TREATMENT OF LACRIMAL OBSTRUCTION.

J. A. MacMillan, M.D.

MONTREAL.

The procedure which I wish to describe is the outcome of my operative experience with lacrimal cases at The Royal Victoria Hospital, Montreal, where, thru the suggestion of Dr. Byers, and thru his kindness and that of Drs. Stirling, Tooke, McAuley, and Rosenbaum, the entire material of this sort has been placed at my disposal during the past year.

The original intention was, that in this way a creditable presentation of the West method might be made before the meeting of the American College of Surgeons in October, 1920. It soon became apparent, however, that the results following the West operation were not uniformly good. After varying intervals a large percentage of the cases revisited the clinic with a return of symptoms. But during the course of this work, it occurred to me that, if one could transplant the transversly incised sac with its natural lumen into the nose, there would be less liklihood of closure than where a portion was excised from the lateral wall; and gradually the following procedure was evolved:

The usual skin incision is made, as for excision of the lacrimal sac, extending from just above the tendo oculi down and out, following the orbital margin. The skin is dissected up on the orbital side exposing the orbicularis muscle; the muscle is spanned up to the tendo oculi; and, on retracting both sides, the sac, covered by fascia, which passes from the posterior to the anterior lacrimal crest, is brought clearly into view. An incision is made thru the periosteum just in front of the anterior border of the sac; and with a blunt dissector the latter is raised from its fossa. The posterior border is also made free, and a tenotomy hook can be passed beneath the sac, up and down from the tendo oculi, to the beginning of the lacrimal canal.

The fascia covering the outer wall

of the lacrimal sac is continuous inferiorly with the periosteum on the floor of the orbit; and it is incised just where it passes off to become such. The sac is also cut transversely as far down in the canal as possible. A long silk suture is inserted thru the fascia near the lower end, leaving each end of the thread long, and with no knot.

A small lacrimal probe is now passed thru the canaliculus into the sac to make certain that it has been divided above the obstruction. The sac is now pulled upward toward the brow by the suture and a retractor, exposing the whole lacrimal fossa below the tendo oculi, which is always left intact.

The periosteum of the posterior half of the fossa is pushed backwards and forwards, exposing the lacrimal bone, which is extremely thin. An opening is made thru the bone into the nose with a sharp probe, and enlarged with a blunter one. I use a punctum dilator for this,—the sharp end to go thru, and the big end to enlarge the perforation to about the size of a pea. A small wick of gauze may be placed thru the opening and caught by a pair of forceps in the nose. Then by gently drawing backwards and forwards the margins can be made smooth. The orifice thus made is beneath the middle turbinate on the nasal side, and in front of the infundibulum.

Forceps are passed into the nostril, to grab both ends of the suture placed in the opening. The sac is then drawn down into the nose. The fascia is very strong, and holds the suture well. As it is also very closely attached to the sac, the latter must follow on traction. The suture is tied over a plug of gauze placed in the nostril for the purpose; the lacrimal canal is curetted as after excision of the sac; and the skin is sutured. A pad is placed over the wound; and a bandage applied.

The nasal plug is taken out on the second day; but the suture in the fascia is left until the fifth day, when it is removed with the skin suture, by drawing on either end.

It is too early as yet to make any positive claim in regard to this operation; but the results to date have been so uniformly successful as to seem to justify bringing the matter to the attention of the profession in a preliminary note.

Ether has so far been used on all cases, but I hope to attempt block anesthesia on the next patient. I must close this note with a word of thanks and appreciation to Dr. S. E. Whitnall, Professor of Anatomy, McGill University, for free access to his anatomic material, and for helpful suggestions.

Postcript.

Since writing the above I have performed the operation under local anesthesia with satisfying results as follows:

Two pledgets of cotton, dipped in 10% cocain to which adrenalin has been added, are pressed dry. One is placed in the roof of the nose over the cribriform plate, and the other under the anterior end of the middle turbinate.

The infraorbital nerve is blocked after the method described by Smith ("Block Anesthesia and Allied Subjects"), that is, by injecting 20 minims of a 2% solution of procain (made fresh by dissolving the procain with suprarenin tablets in boiled distilled water) at the orifice of the intraorbital canal, the needle being passed in the bicuspid fossa and parallel to the long axis of the second bicuspid tooth.

To insure compete loss of sensation at the upper end of the incision, 10 minims are injected subcutaneously at and above the tendo oculi.

I have also applied this method with entire success in ordinary excision of the lacrimal sac previous to cataract operation.

My attention has been called to a paper by Dr. F. E. Burch, in the Transactions of the American Academy of Ophthalmology and Oto-Laryngology for 1920, describing an operation along somewhat similar lines. The central idea, being the passing of the lacrimal duct into the nose, is the same; but the procedures differ in many other details.

SUBCONJUNCTIVAL INJECTIONS OF DRUGS FOR INTENSIVE ACTION UPON THE IRIS.

WILLIAM BROWN DOHERTY,

NEW YORK.

Recognizing the fact that we are able to obtain better anesthesia by subconjunctival injection of cocain than by instillation, it occurred to me that agents could be used in a similar manner in ocular affections in which we desire intensive action upon the iris or deeper parts of the eye. Accordingly I have injected atropin subconjunctivally with excellent results, as illustrated in the following brief histories.

CASE 1. Male, age 56, with history of recurring attacks of iritis. R. E. showed a number of pigment spots on the anterior capsule of the lens and posterior synechiae; the eye was quiet. V. equals 20/15 with correction and T.n.

L. E. had been painful during the previous four days, and he used the atropin left over from the treatment of a former attack, but without relief. When he entered the hospital, examination showed: cornea hazy; marked circumcorneal injection; aqueous cloudy; iris congested, dull in color, covered with exudate and bound down to the anterior capsule of the lens along the whole pupillary margin (iris bombé); tension 47; V. 3/200, with no improvement.

A small amount of powdered atropin was placed in the lower cul-de-sac, and hot compresses were employed. The second estimation of tension one hour later was the same as the first, and there was no dilatation of the pupil.

1/150 of a grain of atropin sulphat was injected subconjunctivally in the lower cul-de-sac, and hot compresses continued. In half an hour there was slight dilatation of the pupil; at the end of an hour, the pupil was irregularly dilated, and the tension dropped to 32. 1% solution of atropin sulphat was instilled into the eye twice during the night; the following day tension was normal, the pupil widely but irregularly dilated, the adhesions evidenty being old, and the sequellæ ofobtained. previous attacks of iritis. V. equals 20/30 with correction. The man disappeared and was not seen again.

CASE 2.—Service of Dr. Charles H. May, Bellevue Hospital: This patient was a man of 62, who had been complaining of pain, lacrimation, photophobia, and reduction of vision in L. E. He had been treated at the New York Eye and Ear Infirmary, where drops and an eye wash had been prescribed, but had not returned to that institution.

Examination of L. E. upon admission showed marked circumcorneal injection, cornea hazy, aqueous cloudy, iris dull, discolored, covered with an exudate, and the entire pupillary margin bound down to the anterior capsule of the lens (iris bombé), tension 54.

At 6 P. M. 1/150 of a grain of atropin sulphat was injected subconjunctivally and hot compresses employed; at 8:30 P. M. there was considerable dilatation of the pupil and tension had been reduced to 38; atropin sulphat 1% was instilled every 15 minutes for three doses. The next day the pupil was widely dilated, tension 23, and the eye was free from pain with V. 20/30. There were marked pigment deposits on the anterior capsule of the lens in the shape of a complete circle. The fundus was easily seen and was normal.

These two illustrative cases demonstrate the rapid and brilliant action of atropin, used subconjunctivally, in dilating the pupil and reducing tension in iris bombé, with increase of tension. I have found similar advantages when pilocarpin was injected subconjunctivally in a limited number of examples of chronic glaucoma with marked increase of tension. In these cases the pilocarpin was found to act much more quickly and decidedly than when employed in the usual manner by instillations.

I am at present employed in following up the results obtained from this method of using atropin, pilocarpin, and eserin, and hope before long to be able to report a much greater number of instances in which these agents were used subconjunctivally, and to give the results

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

November 18, 1920.

Dr. G. Oram Ring, Chairman.

Anatomic Relations of Optic Nerve and Chiasm to Paranasal Sinuses.

J. Parsons Schaeffer, Professor of Anatomy, Jefferson Medical College, Philadelphia, said that the retina from the viewpoint of embryology is a part of the brain, and the socalled optic nerve is a brain fiber tract supported by neuroglia elements and incomplete fibrous septa, and surrounded by tubular prolongations of the cerebral meninges and the meningeal interspaces. There is nothing in the visual apparatus which strictly corresponds to a peripheral nerve.

The axones composing the "optic nerve," commissure and tract arise from the ganglionic cells located in the retina and with the latter constitute neurons of the third order in the visual pathway. The fibers or axones converge toward the optic disc, pierce the vascular and fibrous tunics of the eyeball; then course centrally as the "optic nerve," the optic commissure and the optic tract, to terminate in the thalamus, the metathalamus and the midbrain. Identically the same axones or fibers form without interruption, and in order, the "optic nerve," the optic commissure, and the optic tract. It would, therefore, be more appropriate to designate the entire pathway the "optic tract." The fibers of the tract are medullated, but lack a neurolemma, being in general agreement with brain and spinal cord fiber tracts, in which the neurolemma is absent or greatly reduced.

In animals, man included, with an overlapping of the fields of vision of the two eyes and stereoscopic vision, the decussation of the optic pathways in the commissure is incomplete, while in vertebrates below mammals, the decussation is complete or nearly so. The more laterally placed the eyes the more nearly complete is the decussation.

Therefore, in dealing with the anatomic relations which exist between the optic nerve and the optic commissure and the paranasal sinuses, one is concerned with a partially decussated brain fiber tract with cell bodies located forward in the retina, rather than with a peripheral nerve. The efferent neurons of the optic nerve with cell bodies located centrally need not concern us in this connection.

The socalled optic nerve leaves the eyeball approximately 3 mm. to the mesial side of the posterior pole and follows a slightly serpentine course dorsalward, medialward, and cranialward toward the optic foramen or canal in the apex of the orbit. After traversing the optic foramen medial and cephalic to the ophthalmic artery, the optic nerve courses intracranially, converges toward the midline, and after a variable distance meets with its fellow in the formation of the optic commissure or chiasma. It is, therefore, obvious that the two optic nerves are far apart ventrally where they leave the eyeballs and gradually converge more and more, ultimately to merge in the vicinity of the tuberculum sellæ (olivary eminence), between the internal carotid arteries. It is equally clear that for some distance behind the eyeballs the optic nerves are separated from the thin osseous walls of the paranasal sinuses by the interposition of a goodly amount of orbital fat. Moreover, as the optic foramen and the optic commissure are neared, the topographic relationships between the optic nerve and commissure and the paranasal sinus become more and more intimate, ultimately resulting in very many cases in the optic nerve and commissure, coming into actual contact with the thin osseous walls or the mucous membrane (when osseous dehiscences are present) of certain of the paranasal sinuses, especially the posterior ethmoidal and the sphenoidal.

The optic nerve topographically may

be divided into *ocular, orbital, foramen* and *cranial segments.* The whole nerve varies in length, the greatest variation occurring in the length of the cranial segment, the optic commissure being formed at a variable distance dorsal to the optic foramen. The following table is illustrative of this variation (Table A):

TABLE A.

Cadaver.	Total length.	Orbital.	Foramen.	Cranial.
M.....	49 mm.	27 mm.	6 mm.	16 mm.
N.....	38 mm.	28 mm.	6 mm.	3 mm.
O.....	43 mm.	30 mm.	5 mm.	8 mm.
P.....	33 mm.	25 mm.	4 mm.	4 mm.

For our purposes here it is well to divide the optic nerve into *sinus* and *nonsinus portions* and to compare these segments with the entire length of the nerve, using *sinus portion* to mean that segment of the nerve which is *2 mm. or less* from the walls of the paranasal sinuses. The following table indicates this comparison and relationship (Table B):

TABLE B.—LENGTH OF OPTIC NERVE (IN MILLIMETERS).

Cadaver.	Total length.		Nonsinus portion.		Sinus portion.	
	Right.	Left.	Right.	Left.	Right.	Left.
A	45	45	24	21	21	24
B	37	35	14	13	23	22
C	44	44	21	22	23	22
D	40	40	19	23	21	17
E	55	48	28	27	27	21
F	43	41	15	15	28	26
G	48	46	24	20	24	26
H	39	42	15	14	24	28
I	38	40	16	20	22	20
J	40	40	30	10	20	20
K	37	36	14	14	23	22
L	54	48	28	27	26	21

The great variations in size, shape, number and type and the variations in symmetry and asymmetry of the paranasal sinuses preclude any constancy in the topographic relationships of the optic nerve and the commissure to the sinuses. Unfortunately it is not the province of this brief abstract to discuss at length the variations in the anatomy of the paranasal sinuses. In passing, however, it should be mentioned that at best the osseous walls of the paranasal sinuses are thin; indeed, often of a filmy character. Again, the osseous walls may be developmentally defective, leading to a condition whereby the mucous membrane of the related sinuses comes into actual contact with the dural investment of the optic nerve and the optic commissure. Indeed, the lateral wall of the sphenoidal sinus may be so defective that the mucous membrane lining the sinus protrudes as a hernia or a diverticulum. The thickness of the plate of bone between the optic foramen and the contained optic nerve and the cavity of the sphenoidal sinus varies, according to the material studied, from a total absence to 2 mm.

One or more of the posterior group of ethmoidal cells are nearly always intimately topographically related to the optice nerve. When a posterior ethmoidal cell extends into the body

of the sphenoid bone at the expense of the lumen of the sphenoidal sinus the ethmoidal cell in question replaces the sphenoidal sinus in the optic nerve relationship. In general the most dorsal of the posterior ethmoidal cells concerns us most in this connection. However, at times, other posterior ethmoidal cells not in actual contact with the sphenoidal sinus establish very intimate topographic relationships with the optic nerve as well.

The optic nerve crosses the upper and lateral angle of the sphenoidal sinus. In very many cases the thin wall of the sinus is pushed into a mound-like relief by the nerve, so that in a sense the nerve passes thru the sphenoidal sinus, separated from the contained lumen merely by thin bone, and when osseous deficiencies exist, only by the mucous membrane. The asymmetry of the sphenoidal sinuses may be so great that either the right or the left sinus establishes intimate and vital relationships not only with the optic nerve of the same side but also with the optic nerve of the opposite side. For example, one encounters specimens in which the right sphenoidal sinus comes in actual contact with the right optic nerve, the optic commissure and the left optic nerve, the left sphenoidal sinus being wholly crowded from the usual intimate topographic relationship. The opposite anatomy also prevails with equal force.

The optic commissure bears a variable relationship to the sphenoidal sinuses. The inconstancy of the relationship is due, first, to the great variations in size and shape and to the asymmetry of the sphenoidal sinuses, and, second, to the variations in the distance behind the optic foramen at which the optic commissure is formed (see Table A). In very large sphenoidal sinuses, especially in the ventrodorsal plane, the optic commissure is located in the roof of the sphenoidal sinus and some distance in advance of the dorsal wall. On the contrary, in small sphenoidal sinuses, the optic commissure lies dorsal to the sphenoidal sinuses. Moreover, the intracranial segment of the optic nerve is relatively long and the optic commissure formed far dorsal, the commissure rests upon the hypophysis cerebri and the intimate topographic relationships between the optic commissure and the sphenoidal sinuses are thereby precluded. The location of the optic commissure immediately above the hypophysis is very common. It is when the intracranial segment of the optic nerve is short and the optic commissure formed over the tuberculum sellæ ventral to the location of the hypophysis cerebri that the very intimate topographic relationships between the optic commissure and the sphenoidal sinuses are made possible. Of course, in those cases in which the sphenoidal extend forward into the ethmoidal masses, thereby replacing certain posterior ethmoidal cells, the optic commissure is always in the roof of the sphenoidal sinuses. Owing to the almost constant asymmetry of the sphenoidal sinuses it is rather common to find one or the other of the sinuses wholly replacing its fellow in the topographic relationships with the optic commissure. In symmetric sinuses both sinuses may share the usual commissural relationships.

The ostium of the sphenoidal sinuses is disadvantageously located for good drainage, being placed a goodly distance from the sinus floor. Indeed, in some cases pus in the sinus would rise almost to the location of the optic foramen before it could escape thru the aperture of the sinus into the nasal cavity. The following tables illustrate this relationship (Tables C and D):

TABLE C.

Side.	Distance from center of ostium sphenoidale to roof of sinus.	Distance from center of ostium sphenoidale to floor of sinus.
R.	12	17
L.	10	13
R.	12	12
L.	12	9
R.	2	3
L.	16	13
R.	2	20
L.	12	17
R.	3	6
L.	12	4
R.	15	17
L.	17	16

TABLE D.

Distance Between Optic Nerve and Ostium Sphenoidale.

Cadaver.	Right.	Left.
A	8	12
B	9	5
C	9	11
D	15	15
E	2	2
F	4	0
G	6	0
H	12	12
I	4	4
J	2 above	1 above
K	3 above	2
L	6	13

The frontal sinus when of the supra-orbital type and well developed dorso-medially may establish intimate topographic relationships with the optic nerve in the neighborhood of the optic foramen. As a rule, however the frontal sinus is not vitally related.

In the vast majority of instances a goodly amount of orbital fat separates the maxillary sinus from the optic nerve. Rarely, however, when the maxillary sinus pneumatizes beyond the confines of the maxilla into the orbital plate of the palate bone and into the neighboring ethmoidal mass it comes in contact with the optic nerve, thin bone alone intervening.

The most dorsal of the anterior group of ethmoidal cells occasionally are a factor in optic neuritis. This is when the anterior group of cells encroach upon the more usual confines of the posterior group. It should always be recalled that it is not the location or topography of the ethmoidal cells that determines the groups, but the location of the ostia of the cells in the nasal cavity; the anterior group draining into the nasal cavity caudal to the attached border of the middle nasal concha and the posterior group cephalic.

Discussion. Dr. James Bordley, Jr., of Baltimore said: The ocular symptoms in disease of the sinuses may be inflammatory neuritis, retrobulbar neuritis and choked disc, altho it must not be inferred that ophthalmoscopic changes are to be discovered in the fundi of every patient with sinuitis. On the contrary, in only a comparatively small proportion of cases do they occur.

Dr. Bordley emphasized the importance of the enlargement of the blind spot of Mariotte in sinus disease, altho he was forced to object to the suggestion that enlargement of the blind spot was a constant symptom. In 102 patients with sinuitis, enlargement of the blind spot was discovered but 31 times, and it was found 5 times as frequent in disease of the posterior as of the anterior sinuses. In his experience subnormal accommodation was a more frequent symptom of sinus disease.

Dr. Charles P. Grayson said: It may be true that the larger number of sinus inflammations, both symptomatically and clinically, are so aggressively obvious that the ophthalmologist will need no assistance whatever in recognizing their existence, and there are many others in which thru the history of a more or less severe infective rhinitis, followed by deep-seated intranasal pain or persistent headache at the vertex or perhaps occipital in its location, he will be easily able to make at least a presumptive diagnosis with a great deal of confidence; but there are still others, unfortunately not few in number, in which the rhinologist himself must be deliberate rather than hasty in reaching a diagnosis. In such cases, obscure perhaps because of their smouldering quiescence, there is one fact that will bear a little emphasis, and that is that a merely clinical examination if negative will have very little value. It is no more to be relied upon than is a single negative Wassermann. The failure to discover pus in the middle meatus, the sphenoethmoidal sulcus or on the posterolateral wall of the pharynx is far from being conclusive evidence as to the health of the sinuses.

Dr. Grayson assumed that in this clinical scrutiny we have relieved any obstruction to drainage from the normal ostia, that we have called upon the law of gravity and have availed ourselves of irrigation when possible and of the rather equivocal suction apparatus in the effort to extract pus from the sinuses, but nevertheless failure to secure it does not complete our examination. Naturally, we next appeal, and

with much confidence, to the X-ray plate, and yet not always with implicit confidence, for its findings, for several reasons, may be dubious and inconclusive even when its tonal values are interpreted by an expert. In such cases nothing remains for the conscientious, thoro clinician but to ask permission to make an exploratory opening into the suspected sinus. If this be granted and a sufficient opening made, doubt will vanish.

Dr. Wm. Campbell Posey spoke of some of the less striking but perhaps more common symptoms of sinuitis. He thought asthenopia was often provoked by a chronic inflammation of the conjunctiva, with enlargement of the lymph follicles, occasioned by the spread of the inflammation of the mucous membrane lining the sinuses to that lining the lids. He said that actual testing would often show a diminution in the range of accommodation.

Edema of the lids is one of the most significant symptoms of disease of the accessory sinuses and may often be the means of calling attention to the existence of an inflammation in these cavities, the extreme thinness of the skin of the lids and its loose attachment to the sublying parts, causing even a comparatively slight sinuitis to give rise to this condition. The puffiness is usually most marked in the upper lid and particularly on the nasal side, tho the entire lid may be swollen. This edema is to be distinguished from the inflammatory swelling and thickness of the lid which results from cellulitis, as it is entirely noninflammatory in origin as well as in appearance, and also from the ptosis which is at times present as a result of a palsy of the levator of the lid. The swelling is usually most marked in the morning and disappears during the day, but it is also liable to be brought on by bending the head forward. Like all other symptoms of sinuitis the edema may disappear for a time with the discharge of secretion from the sinus, but reappears when the fluid reaccumulates and the congestion of the mucous membrane becomes greater.

Dr. Posey said that while fifteen years ago sinuitis was rarely held responsible for optic nerve disease, there was now a tendency in some quarters to attribute all cases of optic nerve disease, for which no other cause could be found, to sinus trouble; and to operate upon those cavities even tho actual evidence that they were in a pathologic condition was not present. He referred to a recent communication by Cushing, who called attention to the harm done by such abuses.

In conclusion, Dr. Posey said that he was an advocate of *the orbital incision* in all cases of orbital disease from the sinuses, and he believed the association of the rhinologist and ophthalmologist in the performance of such operations most desirable. Closure of the orbital skin incision, after the diseased tissue has been removed from the affected sinus, and free drainage established into the nose by tubes of good size, which should be permitted to remain buried *in situ* until the drainage canals have become well established, should be practiced whenever possible.

Dr. George Fetterolf spoke of the difficulties attending the diagnosis of sinus conditions. He took up and discussed, as bearing on this question, anomalies, the usefulness and limitations of transillumination and X-rays, and the inadvisability of making a negative diagnosis on one examination. He stated that vacuum headaches and neuralgias of the sphenopalatine ganglion, as brought out by Sluder, should always enter into the calculation. He expressed the opinion that there should be greater cooperation between the ophthalmologist and the otolaryngologist, emphasizing the importance of having the former examine suspected sinus cases with the idea of noting conditions which were unknown to the patient and which would be of distinct sinus diagnostic value. Dr. Fetterolf further stated that neither he or anyone else was satisfied with the present status of sinus diagnosis and treatment, and hoped for better things thru improved X-ray technic, a constant thinking by the otolaryngologist in terms of anomalies, by greater intensive study of each case and by closer association of the eye and nose specialists.

Dr. Luther C. Peter recalled an excellent paper read before this section about two years ago by Dr. Ring, who said: "It is a fact that the careful spe-

cial testing of visual function, and the finding of certain changes in the visual field, may establish a diagnosis before nasal symptoms have been sufficiently marked to attract attention; and, further, it is not infrequent for closed empyemas and mucoceles to give a false sense of security by an almost total absence of nasal symptoms notwithstanding the presence of ocular change." To these well-established facts should be added a third, that visual field changes may be detected before patients complain of a disturbance of vision and before the ophthalmoscope reveals any fundus pathology. These facts form a tripod upon which the claims of ophthalmologists rest in insisting that all sinus cases should be studied from an ophthalmologic standpoint, and especially by means of perimetry.

Enlargement of the blind spot in disease of the posterior cells is generally accepted as an almost constant symptom. The exact means by which this is brought about is not nearly so important as the recognition of the fact that it does exist. It means a perineuritis in some part of the nerve, and the proximity of the optic foramen to these cells is most apparent. It probably is the result of continuity of tissues and of toxemia. It is present in acute and chronic disease. It is rarely present in disease of the anterior group. If present in the anterior group it is a late phenomenon, is associated with other field changes, with gross fundus pathology and usually is part of a central scotoma.

Chiasmal anopsias are equally localizing in value. They are more or less infrequent complications and usually signify advanced chronic disease of the posterior ethmoids and sphenoids. Almost any variety of chiasmal anopsias may occur.

Enlarged blind spots and irregular anopsias are definite and localizing. They belong to the posterior cells. Other field changes are not so differentiating in character, but are just as important and perhaps even more than those mentioned in estimating the amount of damage sustained by the optic nerve. In order to give them their proper interpretation, however, they must be studied in connection with other symptoms, with the appearance of the fundus and especially with those found in the nose. Their chief value lies in determining the degree of damage, and as such they should be a part of every routine examination for sinus disease.

Surgical interference may be indicated by the nasal findings, but surgery should not be practiced without proper ophthalmologic studies, and visual fields should always be carefully plotted. Statistical studies reported in the literature vary some as to the percentage of cases in which visual field changes are found. Wallis found 100 per cent of cases involved in disease of the posterior cells and 90 per cent of total cases. Other writers place the percentage, at least, of the anterior cells lower. Markbreiter found 76 per cent of the anterior cells had pathologic fields. The reasons for these discrepancies are threefold:

1. A limited number of cases, especially of the anterior group, are not accompanied by optic nerve involvement.

2. A large number of cases never reach the oculist for study.

3. Perimetric technic may be faulty. These studies must be painstaking. They cannot be made on a perimeter. They should be made on a tangent screen of a one meter radius.

Inasmuch as the optic nerve is involved in so many cases of disease of the paranasal cells, all cases of sinus disease should be studied from the standpoint of the ophthalmologist as well as from that of the rhinologist. Careful perimetric measurements are a most important part of such studies.

Dr. E. B. Gleason said the picture of the frontal sinus extending far back over the orbit reminded him of one he saw in the dead room that also extended upward nearly to the coronal suture. It occurred in an old man and probably there is a tendency for all the paranasal sinuses to enlarge in old age. The presence of processes from the mucoperiosteum extending into the bone explains why in attempting to extract the mucous membrane from a posterior ethmoid cell or the sphenoid if the orbital wall is thin, bone will sometimes come away with the

mucous membrane as the result of traction.

According to Leon E. White, of Boston, accessory sinus blindness results from (1) direct spreading of the infection to the sheath of the optic nerve, (2) toxemia, (3) hyperplasia.

In chronic cases of infection of the posterior ethmoids and sphenoids there may not be any symptoms for years except postnasal secretion and occasional headaches. Phlebitis of the cavernous sinus, meningitis and brain abscess are rare. The same is true of loss of vision. Blindness may persist for a time, to be followed by spontaneous recovery, altho if it persists for several months it may be irremedial. As improved vision sometimes occurs after a discharge of pus it would seem to be often more intimately connected with retained secretions than the infection.

White in the paper referred to above gives a series of cases of blindness in which improvement followed removal of the middle turbinate and opening the sphenoid. The simplicity of his operative measures is noteworthy. In some of his cases there was no marked nasal lesion either by inspection or the X-ray —only hyperplasia, which is defined as a "rarefying osteitis associated with inflammatory swelling of the mucous membrane lining the accessory sinuses." Jonathan White, quoted in the same paper, states: "It would be difficult to find an adult individual in a temperate or cold climate who does not present an example of this bone change within his nasal chambers." White also quotes MacWhinnie as advocating, in 1910, opening the sphenoid in cases of optic neuritis as a practically harmless procedure. However, having met wth fatalities, MacWhinnie soon afterward practically abandoned all operative procedures in suppuration of the paranasal sinuses in favor of treatment by suction. So greatly has the popularity of nonoperative treatment of accessory sinus suppuration increased that a recent folder of a prominent New York instrument maker is devoted entirely to suction instruments. Besides suction other methods of treatment have been devised. One recently proposed consists in filling both nasal chambers with normal salt solution and *floating* out the pus contained in the sinuses. It is said to have succeeded in cases in which operative measures failed.

Dr. Geo. E. Pfahler said it was his custom to make at least three posteroanterior views of the sinuses, and in this way one gets the outline of the sinuses in the transverse vertical planes and therefore shows the lateral and vertical limitations. He then makes two lateral views, either stereoscopically or one from each side, which gives a view of the vertical plane in the longitudinal direction and therefore gives the anterior and the posterior and the upper and the lower borders. He then makes a vertical exposure, which gives the horizontal plane and shows the anterior, the posterior and the lateral borders. By a carefuly study of these the exact size, outline and position of the accessory sinuses can be shown. Disease produces either an opacity of varying degrees or causes thickening or destruction of the walls of the sinus. One must always keep in mind the value of these transparencies and opacities of shadows in proportion to the size. A small sinus may give no more transparency, tho healthy, than a large sinus filled with exudate. Therefore the value of these shadows must be interpreted most carefully. We encounter many technical difficulties, but these are gradually being overcome. In 1912 he described an oblique view of the sphenoid sinuses by means of which technic the sphenoid sinus was projected into the orbital area and by comparison of the two sides additional information can be obtained. We cannot determine, in all instances, the relations of the optic nerve to the accessory sinuses, but in many instances the optic foramen or canal can be shown.

Dr. Pfahler was quite sure that by means of roentgenography the greatest information concerning these sinuses can be obtained, but skill is necessary both in the making of the films, and in their interpretation.

J. MILTON GRISCOM, M.D.,
Clerk.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

February 8, 1921.

DR. ELLETT in the chair.

Amblyopia Since Birth.

DR. FAGIN presented a boy of 8 years, blind in the right eye since birth. This boy is a twin, the second to be born. The parents felt that the attending physician had injured the eye doing a manual delivery. The mother noticed when the baby was two weeks old that the right pupil was larger than the left and that the iris and cornea seemed smaller and that there was a whitish line across the lower border of the right pupil. Dr. Fagin saw the patient first on September 6, 1918, at which time there was not even light perception in the right eye. Right pupil dilated and oblong. Vitreous filled with exudates. Iris atrophied. Ball turned in and up. No inflammation. Left eye normal in appearance; vision 20/30. A plus 0.50 S. was prescribed for school work. Dr. Fagin saw this patient again January 17, 1921, when there was quite a decided change for the worse. The right ball was red and hard to touch. The entire vitreous is opaque. The sclera was thinning and there was a dark choroidal ring above near the limbus. The iris more atrophied and tremulous above. Tension—McLean 50. Left eye in a state of irritation. Dr. Fagin advised enucleation and was interested to see if there was an intraocular growth or if the opacity was due to inflammation.

DISCUSSION. Dr. Savage said that if the boy were three or four years old he would think the case one of glioma of the retina. He was anxious to see the specimen after removal.

Dr. Stanford thought it a cataractous lens with extremely deep posterior chamber.

Dr. Fagin had seen the child two years ago, and was certain there was no cataract at that time; but he saw vitreous opacities and pupil changes. He is sure that the vitreous is involved.

Trauma of Head Followed by Blindness.

DR. FAGIN presented a colored man, 31 years old, who was struck on the head June 16, 1918, following which the patient has noticed that his vision has grown gradually worse. From August 29, 1918, the patient has been blind, not even light perception in either eye. Examination revealed normal appearance of eyeballs and lids. Each pupil slightly dilated and immovable. The brightest light had no effect on pupils. The fundus has normal appearance except for the fact that the nerve heads were rather white and bluish in tint; not a typical atrophy. The blood vessels are normal in appearance. The problem of this case is whether the injury to the back and side of the head, which shows scars, could have caused the blindness.

DISCUSSION. Dr. Lewis asked if the patient's mentality was affected to which Dr. Fagin answered in the negative.

Dr. Simpson said that the condition might be due to injury to the visual center, or posterior to the point of entrance of the vessels to the nerve.

Dr. Blue agreed with Dr. Simpson.

Dr. Anthony said that it might be due to brain tumor or toxemia.

Dr. Ellett said that the condition was hard to understand, as many cases in negroes do not look like primary atrophy, and believed it due to the injury.

Dr. Stanford asked Dr. Ellett just what would take place to produce such effect.

Dr. Ellett answered that a depressed fracture or hemorrhage would.

Secondary Cataract.

DR. ELLETT presented a man upon whom he had operated for cataract in each eye. Simple extraction with corneal suture on each eye. The right eye had a perfectly clear pupil without secondary cataract; vision 20/20 with glasses. In the left eye there was much reaction and a dense secondary cataract; vision with glasses 20/40.

Double Ptosis.

DR. ELLETT presented a girl of eleven years upon whom he had done a double Motais operation for ptosis, four years ago. The operation was performed un-

der general anesthesia. The result was very good altho not the same in the two eyes. A greater result was obtained in the right eye and the child tends to sleep with the eye open and there is occasional corneal irritation.

DISCUSSION. Dr. Levy thought the results wonderful.

Dr. Simpson asked if corneal ulceration ever followed this operation.

Dr. Ellett said that he had not seen such but said that in a paper on the Motais operation by Bruns he mentioned a case followed by corneal ulceration.

Zonular Cataract.

DR. ELLETT presented a boy four years old with zonular cataract in each eye. Eyes otherwise normal. A free discission had been made in the right eye five days ago. The lens was much swollen and the opaque nucleus was broken in several pieces and lying in the anterior chamber. There was scarcely any reaction.

Optic Nerve Atrophy.

DR. ELLETT presented an elderly negro with mental disturbance which precluded the possibility of obtaining a history. There was loss of vision in each eye. The pupils were fixed. The right eye showed a cupped and atrophic nerve. The left eye showed atrophy of the nerve with hemorrhages and connective tissue changes associated with the retinal vessels. There were bands of retinitis proliferans and other bands along the vessels as well as irregular retinal hemorrhages. Tension R. 40, L. 52, Gradle.

Exudative Choroiditis.

DR. ELLETT presented a young lady who had exudative choroiditis and fine vitreous opacities, of one week duration, the cause being as yet undetermined. Physical examination negative. There were fresh choroidal exudates up and in from the disc, and beyond them a pigmented area probably the scar of a previous attack. Vision was slightly reduced.

DISCUSSION. Dr. Blue said that this was apparently a second attack.

Dr. Simpson asked if the tonsils had been removed.

Dr. Ellett answered in the negative.

Dr. Simpson advised the removal of the tonsils.

Dr. Savage asked Dr. Ellett if he had ever seen choroiditis sequent upon a diseased tooth, which recovered after removal of the tooth.

Dr. Ellett answered that he had seen such cases, and stated that many cases of exudative choroiditis are of undetermined origin.

EDWIN D. WATKINS,
Secretary.

OMAHA AND COUNCIL BLUFFS OPHTHALMOLOGICAL AND OTOLARYNGOLOGICAL SOCIETY.

December 21, 1920.

DR. CLAUDE UREN, Chairman.

Primary Sarcoma of the Middle Ear Treated by Radium.

DR. WM. F. CALLFAS read this paper.

Electric Regulated Thermophore.

DR. JAS. M. PATTON showed this instrument devised by Shahan and Post of St. Louis. He stated that he has found best to use it at 150-152 degrees for one minute. He says that it remains constant within one degree. He reported several cases which responded favorably to treatment, especially cases of deep infiltration of the cornea in so-called corneal abscess.

Glioma of Retina.

DR. PATTON reported on two cases seen recently, both in infants. In one case the parents noticed nothing but a slight divergence in one eye; and when the patient was first looked at with a small pupil, nothing could be seen with the opthalmoscope, owing to the patient's restlessness. When the pupil was dilated, however, a tumor could be seen temporal to the nerve. The eye was enucleated and the second eye examined under a mydriatic, no pathology being found in that eye. Frozen sections of the cut end of the nerve showed no extension of the tumor into the nerve. Radium, was used, however, in the socket.

The second case showed a much further developed tumor in the first eye, tho the second eye was free. After enucleation frozen sections of the nerve showed extension of the tumor beyond the cut end. Evisceration of the orbit

was considered but it was decided to use heavy doses of radium.

Fibroma of Optic Nerve.

DR. CLARENCE RUBENDALL reported a large fibroma of the optic nerve, which caused marked exophthalmos, and which was removed completely in its capsule.

Ulcer of Cornea.

DR. SANFORD GIFFORD presented a patient showing a central ulcer of the cornea, occurring with facial paralysis. Scrapings of the ulcer showed gram negative diplobacilli, which grew on blood serum but would not grow on agar and so could be classed as Morax-Axenfeld bacillus. It was treated with applications of 20% zinc sulphat. The anterior chamber was kept open for some time, but in spite of this it proved obstinate to treatment and finally improved rapidly after one application of the thermophore. At present it shows only a leucoma with a moderate amount of congestion.

DISCUSSION. Dr. Lemere stated that he had recently seen a case with a similar ulcer occurring in a man with facial paralysis, which is still under treatment.

S. R. GIFFORD,
Corresponding Secretary.

COLORADO OPHTHALMOLOGICAL SOCIETY.

February 19, 1921.

DR. D. G. MONAGHAN, presiding.

Penetrating Injury of Eyeball.

W. C. BANE, Denver, presented a man aged forty-seven years whose right eye had on February 14, 1921, been penetrated by the end of a nail which he was cutting off. The fragment was about 25 mm. long and 4 mm. in diameter. It entered thru the lower nasal quadrant of the cornea, stuck in the eye, and was pulled out by a layman. It was uncertain to what depth the nail had entered the eyeball. The cut in the cornea was angular and 6 mm. long. The iris was incarcerated in the wound. Blood filled the lower two-thirds of the anterior chamber two days after the accident. Vision was now light perception, the eye was painful, and the tension was about normal.

DISCUSSION. Edward Jackson, Denver. In the series of cases reported by Haab, the large majority of the foreign bodies were fragments from the hammer. In this case, however, we have the exceptional fact that it was the nail that entered the eye.

G. L. Strader, Cheyenne, Wyoming, described a recent case in which a piece of steel from a hammer had lodged in the vitreous, from which it had been pulled with the giant magnet thru the wound of entrance. The wound healed almost completely, but on account of later disturbance the eyeball was eviscerated. A piece of steel one and one-eighth inch long was then encountered, passing thru the coats of the eyeball. The case illustrated the need of making an X-ray study in every instance.

W. C. Finnoff, Denver. The type of eye under discussion is always interesting microscopically, and it is desirable that where the eye is removed it shall be preserved for study. This is especially true if the eyeball has remained in the orbit for several weeks and has then become inflamed again. It is possible to tell whether this is an irritating eye or not by the appearance under the microscope.

J. M. Shields, Denver. In an injury of this kind, is it possible to get a wound between the lens and ciliary body large enough to allow escape of vitreous without serious injury to the ciliary body?

F. R. Spencer, Boulder. I think we see such cases in which the ciliary body has not been seriously injured.

E. R. Neeper, Colorado Springs, referred to a case which had been in charge of another oculist, and in which posterior synechia had developed because the other oculist had used eserin instead of atropin. The reason for doing this was stated to have been a risk of loss of vitreous if atropin were employed. Dr. Neeper strongly questioned the use of a miotic in such cases and felt that here if ever the use of atropin was called for.

Burn from Welding Compound.

W. C. BANE, Denver, presented a man aged twenty-five years who on January 18, 1921, had received in the inner canthus of the left eye a hot welding compound consisting of borax and iron filings. The external tissues over the in-

ner half of the eyeball, including the caruncle and the lid margins, were white from burn. A few scales of metal were removed from the lower cul-de-sac. The patient now showed a marked contraction of scar tissue in the affected area of the bulbar and palpebral conjunctiva. The sight was, however, apparently not affected.

DISCUSSION. J. J. Pattee, Pueblo, remarked that the interesting point about this class of injuries was the difficulty of deciding beforehand how much disfigurement the injury was likely to produce. A burn of the nature of an electric flash may have an ultimate result out of all proportion to the original appearance of the case. Dr. Pattee had seen such a case in which the cornea became ultimately completely opaque, altho immediately after the injury he had failed to appreciate the probability of this occurring.

Congenital Pigment Deposits in Retina.

J. M. SHIELDS, Denver, presented a man aged twenty-seven years who was under treatment for tuberculosis and had come complaining of asthenopic symptoms. The case was presented on account of an apparently congenital peculiarity in the right fundus, consisting of small rounded areas of pigmentation at some distance below the optic disc. The pigment was arranged somewhat like a bunch of grapes, seemed to be entirely in the retina, and was beneath the inferior temporal vein.

DISCUSSION. F. R. Spencer, Boulder. The pigment has such a distinct outline, and evidence of exudate or atrophy is so completely absent, that the condition is very probably congenital.

Choroiditis from Nasal Sinus Infection.

D. A. STRICKLER, Denver, presented a woman aged thirty-five years who had been brought before the society in December, 1920, on account of an obscure disturbance of vision without definite fundus changes; the underlying cause being possibly a multiple infection of the nasal accessory sinuses. The case had unfortunately fallen into the hands of a dentist who had disregarded the wishes of the physician and had limited treatment to irrigation of the antrum thru an opening in the alveolar process. The vision was no better and there were now definite areas of choroidal disturbance. The antrum still gave a shadow on the X-ray plate.

DISCUSSION. J. A. Patterson, Colorado Springs. It is doubtful whether the choroidal disturbance is due to the antral trouble, but the infection in the antrum is probably connected with involvement of the other sinuses. The X-ray appearances outside of the antrum ought to be of special value in this case, particularly as regards the ethmoids and sphenoids.

F. R. Spencer, Boulder, agreed with Dr. Patterson in strongly disapproving of the tendency of some dentists to assume the responsibility of telling patients that such conditions would be adequately treated by draining the antrum into the mouth.

Tuberculous Iridocyclitis.

H. M. THOMPSON, Pueblo, presented a woman aged twenty-two years who in August, 1918, had suffered from a disturbance of the left eye. There had been pain, redness, and gradual loss of vision of this eye. In the early part of 1920 the family physician had obtained a positive Wassermann reaction on account of which the patient had received persistent antiluetic treatment consisting of fifty mercurial inunctions, internal medication and many injections of arsphenamin. During this treatment the left eye became steadily worse. When she consulted Dr. Thompson on February 2, 1921, she was depressed from having been told that the left eyeball should be removed. At this time the right eye was painful and its vision was becoming cloudy. The vision was R. 20/70, L. light perception. There was marked circumcorneal injection of the left eye; the cornea was rough, hazy, vascularized, and infiltrated with minute grayish masses; the anterior chamber was shallow; and there was a light yellow mass 4.5 by 3 mm. in diameter in the lower outer quadrant of the anterior chamber. This mass lay between the 90° and 150° meridians, and extended from within 1 mm. of the corneoscleral junction to the pupil, which was partially covered. It was in contact

with the cornea and merged with another, much smaller mass at the upper outer border of the pupil. The margins were sharply defined, the surface regular and free from blood vessels. The iris was covered with yellowish exudate, and there was an anterior synechia above. The pupillary space was filled with old exudate. The right eye was very irritable, and the cornea was slightly cloudy from minute gray deposits on Descemet's membrane. No change could be made out in the right eye, the pupil of which was clear and reacted to light and accommodation. No pathology could be discovered in the fundus. The patient was underweight and had a temperature of 99.2. Skiagraphs of the chest and teeth were said to be negative. A culture showed streptococci in the tonsils.

A subcutaneous injection of old tuberculin produced a marked reaction in each eye, especially the left, which became so painful the night after the injection that the patient was unable to sleep. The right optic disc was found to be swollen and highly colored, but this condition cleared up in four or five days. In the course of a few weeks, under rest, proper diet, tonics, local treatment of the eyes, and several injections of old tuberculin, the patient's general health improved, the right eye became distinctly clearer, and the left eye showed a change in the color of the iris and a marked decrease in the large amount of exudative material.

Discussion. J. A. Patterson, Colorado Springs. The patient probably has a congenital syphilis with a tuberculous infection. There may be a tuberculous infection in the tonsils. The case illustrates the advisability of giving very small doses of tuberculin to start with, even for diagnostic purposes.

Edward Jackson, Denver. The look of the case to me is that it is one of tuberculosis all thru. There is nothing about the cornea suggestive of a parenchymatous syphilitic keratitis and everything about the case can be explained on the basis of tuberculosis.

Magnet Extraction of Wire Embedded in Iris.

H. M. Thompson, Pueblo, reported the case of a man aged twenty-two years who had come after being struck with a piece of baling wire in the right eye. The patient did not think that the wire had entered the eye. The eyelids were swollen, there was pus in the cul-de-sac, the cornea was cloudy, and there was hypopyon to a depth of 3.5 mm. In the upper inner quadrant of the cornea, at about 3 mm. from the corneoscleral junction, was a wound 2.5 mm. long. Higher up in the anterior chamber was a round yellowish mass of exudate about 3 mm. in diameter, in the center of which there seemed to be a black spot. On applying the giant magnet to the eye the mass, together with the iris, was pulled toward the cornea. After several unsuccessful attempts at dislodging the foreign body from the mass, the eye was opened at about ten o'oclock in the corneoscleral junction, a spatula was placed on the iris near the mass, and application of the magnet to the cornea this time freed the particle from the iris. The foreign body was withdrawn by holding the magnet in contact with the spatula. Four days later the hypopyon had disappeared and the cornea was almost entirely clear.

William H. Crisp,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

February 21, 1921.

Dr. E. K. Findlay, in the chair.

Bilateral Traumatic Abducens Paralysis, Tendon Transplantation.

Dr. H. W. Woodruff reported the case of a man, 63 years old, who was seeking relief from a marked paralytic convergent squint in both eyes, and gave a history of having fallen from a street car seven and a half years before, striking on his left outer and upper orbital wall. Following this accident he was unconscious for six hours and saw double on recovering consciousness. There was also a history of a primary syphilitic lesion fifteen years ago, and a four plus blood Wassermann reaction thirteen months ago.

Examination on admittance showed a convergence of 55 degrees in each eye. The right eye could not be abducted from its position of convergence and there was no outward movement what-

ever. The left eye could be abducted as far as the median line. There was marked contracture of both internal recti muscles. The pupils were 3 mm. in size, with sluggish response to light. Blood and spinal fluid Wassermann reactions both negative. Both discs were somewhat atrophic; some of the retinal arteries were sclerosed. R. V.=0.8; L. V.=0.6 — 3.

Neurologic examination revealed an Argyll Robertson pupil, much diminished knee jerk, some loss of coordination of the lower extremities, optic atrophy and bilateral abducens paralysis, and blood Wassermann plus. A diagnosis of tabes dorsalis was made and advisability of operation on the eye muscles was considered doubtful.

On December 31, 1920, transplantation of the outer halves of the superior and inferior recti muscles to the insertion of the external rectus was performed, with resection of the tendon of the internal rectus. This resulted in a slight overcorrection with abolition of convergence and adduction in the left eye, but with considerable abduction.

On January 21, 1921, the same operation was performed on the right eye, except that the internal rectus was simply tenotomized, no portion being resected. This produced no overcorrection in this eye, and no abduction beyond the median line.

The essayist considered the case interesting because it was rare to have bilateral paralysis of the abducens, unilateral paralysis of the muscle being the most common of ocular palsies. Secondly, while it is a case of tabes with positive luetic findings, there was a definite onset within a few hours after a serious head injury. Also, because a good result was obtained by tendon transplantation of the outer halves of the superior and inferior recti muscles, which could probably not be obtained in any other way.

The literature of similar cases of bilateral abducens paralysis following traumatism was reviewed.

The patient had been kept under observation since November 26, 1920. The condition at the time of presentation was as follows: Vision in each eye exactly the same as when admitted. Right eye straight, no strabismus; no abduction but normal adduction, the divergence and loss of adduction being due to the resection of the internal rectus. Fields of vision the same as when admitted. No double vision.

The author was convinced that this operation offered something in the treatment of incurable paralysis, whatever the etiology may have been.

Discussion. Dr. William H. Wilder said the case Dr. Woodruff mentioned as having been presented some five years ago had recovered. Three or four months after presentation the parents wrote that the child had acquired the power of moving the eyes outward. If recovery was complete in that time it probably meant that the nerve had been pressed upon by a blood clot, and confirmed the suspicion that such was the cause of the paralysis. He had never seen the case since but thought if recovery was complete at that time, it was probably permanent.

Dr. Wilder was interested in the picture of the woman that Dr. Woodruff passed around with the eyes turned in to a great extent. Had he known that this was to have been presented he would have offered a companion picture. That patient subsequently came to him for treatment at the Eye and Ear Infirmary and he operated upon her. It was extremely difficult to get the eyes outward at all. The picture showed the contracture of the converging muscles, which was so great that looking at her from in front, one could see only a small segment of one cornea and about one-third of the other, and she could see a very little thru the slightly exposed slit of the pupil. The operation was very difficult because, as Dr. Woodruff had stated, the contracture of the muscle was so great and there was considerable cicatricial tissue because others had attempted to dissect up the internal rectus. It was possible to get hold of what remained of the internal rectus and forcibly abduct the eye. The external rectus was then exposed and at least one and a half cm. of the tissue and the muscle of the external rectus was excised, and he was able to fasten it firmly to the stump of the external rectus by means of a suture similar to that used by Reese. In this way

the eye was made useful and subsequently he operated on the other eye, with a fair degree of success. Several months later he received a letter from the patient telling of her being able to use her eyes, and one was quite straight.

Dr. D. T. Vail, of Cincinnati, Ohio, stated that the last time he attended a meeting of the Chicago Ophthalmological Society, Dr. Clarence Loeb presented an excellent paper on strabismus and since then he had learned a few additional facts about strabismus that had altered his views somewhat. He called attention to the congenital type in which the patients were born with crossed eyes. There seemed to be congenital paralysis of the sixth nerve on each side which was usually discovered at a very early age. These patients all "cross fired" in the act of seeing. To fix objects on the right they utilized the left eye and in fixing objects on the left they utilized the right eye. If told to look at Mr. Smith on the right side he will not move the eyes at all but will use his convergent left eye to "fix" Mr. Smith on the right, and if then told to look at Mr. Jones on his left side he will still not move his eyes but will shift his attention, using his convergent right eye. The vision in such cases is usually normal in each eye. The convergence is striking and neither eye will pass beyond the median line in the attempt to direct the eyes toward the temple side. The patient automatically shifts his fixation attention from the left eye to the right eye as the object is moved past the center, and vice versa. This type he considered very interesting and altogether different from the case reported by Dr. Woodruff.

The late Dr. Jesse Wyler, of Cincinnati, reported in the Ophthalmic Record some years ago, the case of a child born without power to rotate the eyes outward, in which Dr. Vail had thought it necessary to do an heroic operation to get parallelism. Being somewhat alarmed about that, the parents took the child to see Dr. Wyler, who thought he could do a simple operation that would be sufficient. He did a simple tenotomy of one of the internal recti muscles and achieved a perfect result. When the case was reported Dr. Vail recognized it as being the one he had seen, so he learned that in the congential cases of this type it is not necessary to resect any of the muscles, such as was done in Dr. Woodruff's case.

Recently he saw a young child with marked strabismus and with no power to rotate the eye beyond the middle, on which he performed a simple subconjunctival tenotomy of the internal rectus and applied a scleral stitch to the tissues at the limbus and anchored the eye to the external canthal ligament so that it stood divergently. He left the stitch in for three days and then simply cut the thread, allowing the eye to resume a median position, which it naturally did. The eyes remained perfectly straight; had he done the heroic operation described by the essayist which he had formerly considered necessary, he would not have had such a good result.

Dr. Vail thought Dr. Woodruff's paper made the subject larger than it was formerly thought to be, because he had introduced another form of strabismus than was usually classified in the list of types. The strabismus reported frankly followed traumatism and the citations of similar cases reported in his paper were also entirely traumatic, and so the interpretation must be along the line of the traumatic idea. He thought in these cases a fracture of the skull at the base caused complete loss of function of both sixth nerves. There was another clinical finding which should perhaps have been dwelt upon and that was the presence of central scotoma, and atrophy of the optic nerve, which Dr. Woodruff did not say much about.

Dr. Vail considered the central scotoma and sectional atrophy of the disc as confirmatory evidence that the man had sustained a fracture of the sphenoid bone at or near the apex of the orbit.

Referring again to the cases of congenital bilateral paralysis of the sixth nerve, Dr. Vail believed that such patients usually had emmetropia and perfect vision in each eye. He did not know whether much work had been done to determine what caused the double abducens palsy; but in three of his cases he learned that the children had had an instrumental delivery at birth, and his inference was that hemorrhage had occurred in the region of the sixth nerve,

its trunk or its center, caused by the forceps crushing the skull in the act of delivery. He thought ophthalmologists should pay more attention to such traumatisms and instead of thinking of congenital lesions think of hemorrhagic or traumatic lesions, occurring along the lines of the nerves supplying the eyes. Such cases were not strictly congenital from an embryologic standpoint but rather incident to birth traumatisms.

Dr. E. V. L. Brown called attention to the fact that Professor Fuchs had read a paper before the American Ophthalmological Society in 1911 on central scotoma in tabes and thought this might well be in line with the conception of this case as one of tabes, and not necessarily one of trauma to the base of the skull. Then, too, there was the diagnosis of tabes by two good neurologists. Fuchs discussed 3 cases, stating that they were 3 of 6 he had had, and said there were others in the literature. Dr. Brown had been on the lookout for such cases but had never encountered one, unless this case was one.

Dr. Woodruff, closing, believed with Dr. Brown that the case was one of tabes; but that the immediate cause of the paralysis was the injury. In Dr. Woodruff's opinion the most important factor was the result obtained by the operation of tendon transplantation. Whether this operation should be used in all cases of paralysis was open to question. Other operations, as Dr. Vail said, might be better in other classes of cases, but up to 1917 he had never been able to secure a permanent result in any paralytic case. He could get a temporary result, but in a short time the muscle stretched out again and the immediate result was lost.

In the cases reported at the A. M. A. meeting in 1917, good cosmetic results were obtained. He had had three other cases, the one presented at this time being the fifth case operated on by transplantation. If too much resection of the internal rectus muscle was done there was danger of overcorrection.

Coronary or Wreath-shaped Cataract.

Dr. Robert von der Heydt spoke of this as a common form of progressive cataract occurring in adults.

Cataract is defined as an opacity of the lens or its capsule. The capsule in itself remains transparent and an opacity only occurs if epithelium proliferates or pathologic products deposit themselves thereon; or if by virtue of the retarded resorption of embryonic tissues they present elements which may more or less interfere with capsular transparency. It would simplify matters if the term cataract would be limited to describing opacities of the lens proper.

These latter may be progressive or have to a degree become stationary. Among the socalled stationary cataracts are the various forms of congenital cataracts, also that type of lamellar or zonular clouding called perinuclear cataract, which may be present at birth or progresses in infancy.

A new form of lens clouding exposed by the slit-lamp in combination with the binocular microscope is composed of small chalky, punctate and woolly concretions on and within the axial area of the anterior nuclear surface. This lens change does not lower visual acuity and may be found in 25% of all individuals. It is situated approximately at the site of the original splitting off of the lens vesicle from the epiblastic layer, and is formed at the time just following this separation.

Among the progressive cataracts we have opacities of the lens such as cataracta complicata, which is secondary to other intraocular changes, senile cataract and traumatic cataracts in their varied manifestations, the rapidly progressive lens clouding seen in diabetes and the one which is here described in greater detail.

This form is called coronary or wreath-shaped cataract by Vogt, and is found to be progressive in nature and quite commonly found in adults.

This type of lens opacification formerly was in part called cataracta punctata and also cataracta coerulea or viridis, on account of its blue-green color and was considered quite rare. It originates in the periphery in a zone at the junction of the middle and outer third of the radius of the lens; that is, the opacities are in a thin flat layer and concentric anteriorly and posteriorly with the nuclear surface.

The opacities in their incipiency are club-shaped, the rounded end showing an

abrupt termination axialward, anteriorly and posteriorly, while the other end is lost in an irregular manner toward the lens equator.

In the course of years or decades these club-shaped flat, thin opacities increase greatly in numbers, and the axial zones of the lamellae involved are in addition occupied by faint round or oblong halos of opacification. There may be years of progression without a decrease in the visual acuity, because the pupillary lens area is hardly ever involved. In very advanced cases this type of cataract may be diagnosed by focal illumination with the ophthalmoscope, if the pupil is sufficiently dilated.

In cases which have progressed to this extent the slit-lamp in conjunction with the corneal microscope discloses a vast forest of club-shaped opacities surrounding a comparatively clear lens center in a wreath or garland-like manner. Scattered among these opacities are punctate and linear irregular dots as well as faint circular clouds, the latter especially situated in an axial direction, both anteriorly and posteriorly. Incipient types of this form of cataract have not alone been found in adults but also in senility and at times combined with senile lens changes.

Coronary or wreath-shaped cataract is considered extremely hereditary and has been found in many members of one and the same family. Its heredity is considered synchronous or occurring at the same period of life. As it hardly involves visual acuity it cannot biologically possess a tendency to hereditary elimination. For its detection complete medicinal mydriasis is necessary.

Within the last three months I have found six cases of this form of lens clouding in individuals in my office practice. It may therefore be placed as second in frequency of occurrence to senile cataract.

Case 1. S., male, age 36, vision normal. Very advanced case, shows faintly in focal light with the ophthalmoscope.

Case 2. M., male, age 30; vision normal. Right eye a few club-shaped opacities. Left eye 10 or 12 scattered in lens periphery.

Case 3. Male, age 37; half of a hundred peripheral flat linear atypic opacities. This form bears some relation to coronary cataract because occurring within the same lens area.

Case 4. Elderly woman; several typical club-shaped opacities in combination with incipient senile cataract.

Case 5. Dr. M., age 40. Left eye especially shows most advanced typical form of coronary cataract, visible with the ophthalmoscope. The right a few, invisible in focal light with the ophthalmoscope.

Case 6. Mrs. B., age 46; when 31 years old, 16 years ago I refracted her for the first time under a cycloplegic. I then recorded no lens changes. The vision was practically normal, a small amount of myopic astigmatism.

Ten years ago at a subsequent examination the visual acuity and refraction were the same and she presented a faint circle of fine dots in the lens periphery, which I at that time, from their circular location, diagnosed as an aborted type of lamellar or zonular cataract with only the socalled "riders" visible. I was satisfied at the time that I had overlooked this lens change at the time of the first examination six years previously.

Mrs. B. is now 46 years old and since the last examination under cycloplegia, 10 years ago, shows a very decided pregression of the peripheral lens clouding, by focal examination with the ophthalmoscope.

The slit-lamp presents a vast number of typical club-shaped and other opacities in the periphery of the lens and thereby this most interesting type of recently recognized cataract may now be properly classified.

The visual acuity now is reduced to 20/100 and 20/120, due to myopia of 1.25 and 1.50 D., respectively, under cycloplegia. With glasses the vision is normal.

As the age for the progression of myopia in the usually accepted form of the term had long passed in this patient, it must be concluded that this increase is due to a swelling of the lens substance consequent to the decided increase in the peripheral lens changes within the past ten years, which latter are now so plainly to be seen by focal illumination.

We therefore have in coronary, or wreath-shaped cataract, a very common progressive, hereditary, peripheral lens

clouding occurring in adults, and may now so classify it as a definite clinical entity.

Unilateral Facial Hypertrophy.

DR. E. V. L. BROWN presented a preliminary report on Harry F., aged 4 years, who was brought to the clinic on February 3, 1921, with the history that the left eye had been prominent for some time. Examination revealed a ptosis of the thickened upper lid and a marked prominence of the entire left side of the fore part of the skull. The patient was referred by Dr. D. B. Phemister, of the Presbyterian Hospital, whose report was as follows: "The boy has a classic case of unilateral facial hypertrophy, with a suggestion that later in life there will be hypertrophy of the entire left side of the body. I found on examination that the left leg is about one-half inch longer than the right. The skin of the body contains numerous pigmented patches, one of which is larger than a dollar. This change is fairly constant in hemihypertrophy and localized giant growth in different parts of the body. It is similar to the pigmentation which occurs in von Recklinghausen's neurofibromatosis.

After careful X-ray examination Dr. Hubeny reported: "The Roentgen examination shows an increased vertical diameter of the right orbital cavity; enlargement has taken place particularly at the lower margin. There is an increased density over this region; also, the temporal region adjoining this density is suggestive of an increased soft tissue growth rather than bone. The floor of the orbit is quite difficult to trace, and it appears as tho the malformation or new growth may extend into the nasal cavity. This case will be studied further and reported more in detail at a later meeting.

DISCUSSION. Dr. D. T. Vail asked if a roentgenogram had been taken of the sella turcica and if it showed any enlargement.

Dr. Brown, in replying to Dr. Vail, stated that Roentgen examination of the head showed an increased vertical diameter of the cavity, enlargement particularly at the lower margin, and increased density of the region. No enlargement of the sella turcica was seen.

ROBERT VON DER HEYDT,
Corresponding Secretary.

ROYAL SOCIETY OF MEDICINE. SECTION ON OPHTHALMOLOGY

Friday, February 11, 1921.

President, DR. JAMES TAYLOR.

Commotio Retinae with Extreme Edema.

MR. F. A. WILLIAMSON showed a boy aged 15 years, who six days ago received a blow from a suspended rope in the right eye, and it was immediately followed by loss of sight in that eye. He was first seen four days ago, and during the interval the edema had decreased a good deal. The macula was of a reddish-brown color, and there were two horizontal folds in the retina. He raised the question as to whether the concussion alone could account for all the edema present. When the eye became more quiet, some of the obscure features might be cleared up.

DISCUSSION. Mr. J. B. Lawford said that but for the definite time association of the injury and the edema, he would have suspected that the concurrence of the two conditions was mere coincidence. If there had been rupture of any important vessel, the hemorrhage would have been evident. The folding of the retina was very striking.

Mr. Leslie Paton said that when he first saw the case it presented almost the typical picture of central embolism of the retina. It was still likely there might be blockage of a vessel, the result of the concussion, tho he had never seen so much edema as a result of simple commotio. There might be a tearing of a nerve which affected a vessel and the hemorrhage had not come forward.

Dr. G. Mackay referred to a case which followed a blow from a tennis ball, and agreed with Mr. Paton's suggestion on the present case.

Artificial Eyes and Lids Attached to Spectacle Frame.

MESSRS. OLIVER and JACKSON, attached to the Sidcup Hospital for Deformities, gave a remarkable demonstration of a facial improvement brought by their imitation of the appearance of the normal eye on the spectacle frame of those who during the war had received wounds of the orbit resulting in evisceration. They were highly commended by all the speakers.

Corneal Loupe.

MR. BASIL T. LANG showed an ingenious corneal loupe for removing, unaided, a foreign body from the cornea. At Mr. Holmes Spicer's suggestion, he had added a transilluminator device.

Scotometry.

MR. BASIL T. LANG demonstrated his scotometer, for which ordinary unprepared paper could be used, and the observer could watch the patient the whole time. He also read a paper on the subject of Scotometry. He said that in scotometry one was concerned with more or less blind areas, surrounded by more or less healthy seeing retina, and usually dealt with areas within 40° of the fixation point. It only differed from perimetry in involving a more detailed examination. Two types of scotomata were recognized: absolute, and relative, the latter when an area of the retina, while able to appreciate brightly lighted objects, was unappreciative of certain colors or gray.

Among the points to be considered in determining the size of a scotoma were: illumination, size of the object, color of the object, color of the background, distance of the object, scale and size of the chart, and method of making the observations. If quite a small object were brilliantly illuminated, it might be visible over an area in which a less bright but much larger object could not be seen. In arriving at scotomata, therefore, the light used should not be too brilliant. Direct bright sunlight should be avoided, especially as natural light varied in intensity and color with season. No standard of artificial illumination had yet been agreed upon, but that from a single carbon filament lamp was quite suitable for this purpose.

The size of the object should be measured in terms of the angle it subtends, not by the length of the edge. If using a small object, the patient should be in the best position to see it, and if presbyopic, he should be wearing his correction. Green was less easily seen than red, red than blue, and blue than white. There should be a marked contrast between the color of the object and the background, and the latter should not reflect light. The question of the distance at which the observations should be made was a controversial one; but if working very close to the patient it was difficult to move the object sufficiently slowly to give the patient time to form and convey his impressions. Quite accurate observations could be made at one-third of a meter distance. The scale and size of the chart were matters of personal convenience.

There were many methods, and he laid it down that a good method should be easy to employ, should give accurate results, should enable a permanent record to be made easily, and should enable the observer to watch the patient during the whole examination, to counteract eye wandering. He proceeded to describe and demonstrate his scotometer, and to discuss the features of other makes.

Possibly a patient with a high hyperopia might be the subject of increased intracranial pressure, and then arose the question whether the swelling of the disc was physiologic or pathologic. It was probably the former if the blind spot, when determined with a dull green, was no larger than with a brilliant white light. In some cases of tobacco amblyopia and of retrobulbar neuritis scotomata for green and red or for green only, might be found; but the chief purpose of scotometry was to determine an increase of the blind spot in suspected glaucoma.

DISCUSSION. Mr. Bishop Harman contended that it was an advantage to be unconscious of the progress of delineating the scotoma until it was completed, as the mind might otherwise be influenced by what was expected. Every effort should be made to exclude the personal equation, and that had been his aim in his own scotometer, which did also enable the observer to watch the patient.

Dr. A. H. H. Sinclair (Edinburgh) referred to the work of previous observers in this field, especially Bjerrum, Rönne, Walker (of Boston), Traquair (Edinburgh) and himself. All those observers realized the importance of using a very small test object. He thought the screen should be at a sufficient distance to so enlarge the scotoma that its details could be studied. The scotoma of interest in early diagnosis was the relative one.

Late Infection After Sclerostomy.

Mr. T. Harrison Butler (Leamington) read a paper with this title, opening with a historical sketch of the work of von Graefe, Grosz, Lagrange (who discovered the first method that could be relied on to produce a filtering scar), Herbert, Evans and Allport, Holth, Freeland Fergus, Elliot. Mr. Butler said the conclusion was that the modern fistulizing operations were more efficient in reducing hypertension than was iridectomy, but that the danger of late infection was a serious offset which had deterred many from performing sclerostomy, driving them to older but less efficient procedures.

He had himself treated eleven eyes the subjects of such late infection, and some of the patients had had a second or a third attack. These tragedies caused him to abandon sclerostomy and revert to iridectomy. But the results of a series of cases were so futile that he reverted to trephining, and a comparison of his later results so completely vindicated the fistulizing method, that he did not propose to again perform iridectomy for glaucoma simplex. His statistic gave 45% of successful iridectomies, as against 75% of good results from sclerostomy. During 1918-9 he trephined 40 eyes for glaucoma simplex, and until recently all had been successful. Two had reappeared with raised tension, and had been trephined with success.

On reviewing his cases over the last five years, he found all the late infections had followed the trephine operation and Holth's punch operation. He discussed a number of informing cases in detail. It was obvious, he said, that the scar left by the punch was far more vulnerable than was the trephine scar; probably there was more bruising. A buttonhole was a serious menace, but in some cases the conjunctiva was so friable that it might tear. The Holth operation belonged to the past. He thought hypertony was one of the conditions favoring late infection. In many of his unfavorable cases alcohol had been a factor. When he knew staphylococcus albus was obtainable from the conjunctival sac, he refused to operate.

In order to avoid late infection he thought the operation could not be regarded as an easy one. A perfect technic should be cultivated, and, consistent with good work, the operation should be done as quickly as possible. The flap should include all the tissues, and should not be bruised. Any local septic focus should be searched for. As an antiseptic lotion for use all the time, he advised a 1 in 10,000 solution of oxycyanid of mercury, used nightly in an eye bath.

Discussion. Mr. S. H. Browning asked whether the eyes were examined bacteriologically before operation, and if so, by what method. If by Elschnig's method, that did not receive general approval. Pneumococcal infections in the eye were quite common. The presence of pus was apt to be deceptive, and should not be the only thing looked for, as eyes apparently healthy were found to contain pneumococci, streptococci and even stapylococcus aureus, in numbers to warrant postponement of the operation.

Mr. Leighton Davies (Newport) emphasized the importance of a sufficiently thick flap; a thin one might lead to late infection.

Mr. M. S. Mayou agreed that a thick flap was an important protection against infection. Another protection was the amount of fluid leaking from the anterior chamber thru the trephine hole. He had had only one case of late infection after trephining; he had seen two others, and in all, recovery was good.

Mr. Harrison Butler (in reply) agreed as to the adoption of good methods of ascertaining whether the conjunctival sac was sterile, but for practical purposes he used a 48-hour culture on agar.

H. Dickinson.

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THE DECENTERING OF CORRECTING LENSES.

All who have studied the action of a lens know that at a single point, the optical center, the two surfaces of the lens are parallel. At all other points the surfaces are inclined toward each other; the optical center being the base of the prism for a convex, or the apex of the prism for a concave lens. When the action of a prism has been mastered, that of a lens is easily explained by the conception of a series of prisms, starting at zero at the optical center and increasing in strength as that point is departed from; so that the prism strength of the lens at any point is proportioned to the curve and the distance from the optical center. But there are certain practical points in the prismatic actions of lenses which are not so generally understood, altho they have been set forth in the literature.

The prescribing of decentered lenses to obtain prismatic effects can replace with advantage the formal prescription of prisms, in all cases where the lens used is strong enough to give the desired prism effect within the boundaries of the mounted lens. Thus if the 1 D. lens were 40 mm. in its horizontal diameter, it could be decentered 20 mm. and thus give the effect a 2 centrad, or 2 prism diopter, or (almost exactly) a 2 degree prism. If the lens were only half as strong, placing the optical center at the extreme edge would only give half the prism strength. And with weaker lenses only slight prismatic effects can be thus obtained. With stronger lenses, such as are usually worn for presbyopia, the effect of prisms quite as strong as can usually be worn can be obtained by decentering. Prismatic effects required for hyperphoria, and often those needed for hypertropia, actual vertical squint, can be obtained by decentering one lens up and the other down.

In supplying a proper decentered lens, the optician will often have to grind it as he does the lens ordered combined with a prism. This is merely a question of the size of the block of glass or blank from which the lens is ground. To carry the optical center to the edge of the finished lens, the surfaced block from which it is cut must have double the di-

ameter of the finished lens. Blocks of this size would generally be a waste of glass, and when a sufficiently large one is not available, one surface must be ground at an inclination to the other, as when a prism is prescribed. But in any case, the accuracy with which the prescription has been filled can best be known by measuring the decentering—the distance from the optical center of the lens to the point at which the visual axis will pierce it, when the patient looks thru it with the eyes in the primary position.

Undesired decentering must be guarded against. Generally good opticians are very careful about it, noticing and explaining about a barely perceptible decentering that is of no practical importance in a lens of moderate strength. In general if both lenses are decentered equally in the same direction, no harm is done. The slight turning of both eyes, or turning of the head, from the position they would otherwise occupy in looking at a particular object falls within the limits of unconscious adjustment, in the continual movements of fixation. When reading thru 3. D. convex lenses at one-third meter, the decentering of each lens 10 mm. to the right would be balanced by holding the book less than 6 mm. (one quarter inch) farther to the left.

On the other hand decentering that disturbs the relation between the two visual axes must be guarded against. Decentering both the 3. D. lenses toward the nose, the amount mentioned, would relieve the convergence from fixing on a point 33 cm. away to the equivalent of fixing on a point about 50 cm. from the eyes, the exact effect varying with the width between the centers of rotation. But it is undesired vertical departures of the centers from the same level or relation to the base line that works the most harm. This is because of the comparatively slight power of the eyes to deviate vertically, the power of sursumduction being commonly only one quarter of the power of abduction, and one-tenth the adduction. To have one center even 1 or 2 mm. higher than the other, with lenses of moderate strength, may be a cause of serious discomfort and failure to give relief.

To secure exact centering vertically is the most constantly important object of accurate frame fitting, the most frequent cause of the needed readjustment of frames, the most common defect of cheap spectacles. Every patient needs to be warned to keep his or her glasses level before the eyes; and it is well to have the patient learn by looking thru the upper edge of his glasses to judge whether they are level, and to make the slight necessary adjustment to get them so.

The decentering of lenses is most commonly useful in connection with the correction of presbyopia. After middle life it is very common for patients to show some weakness of convergence. At the same time, many use their eyes more for reading than they have done when younger. Hence the decentering of convex lenses in, so as to lessen the requirements for convergence, gives relief; which often extends very materially the time that the eyes can be used for such work, without undue fatigue.

Another class of cases helped by the decentering in of convex lenses, are those hyperopes who also have a marked exophoria. Even tho their eyes are suffering from excessive demands on their accommodation, convex lenses prove unsatisfactory because the effort of accommodation helped to overcome the tendency of the visual axes to diverge; and when this help is removed they suffer more with the excessive effort required for convergence.

Myopes too, who have marked exophoria get great relief from the decentering outward of their concave glasses. In hyperphoria with much ametropia it is easy to decenter one lens up and the other down, so as to correct any degree of such tendency. In the large class of cases in which hyperphoria is constant but of low degree, the decentering of one lens offers a simple method of giving help, when one might hesitate to order even a weak prism added to a correcting lens. E. J.

TRIFOCAL LENSES.

These have been used occasionally to meet the special needs of certain patients; but it is probable that they are capable of usefulness in a much wider

field. As Dr. Spengler has indicated in the first article of this issue, their fitting raises additional problems to be worked out by the oculist and the optician, with regard to the areas of the different parts of the glass, their placing before the eye and their centering. But these are practical problems requiring simply accurate measurement under working conditions and the application of common sense.

For general use probably the dimensions suggested in the article mentioned are about the best; but they may have to be modified to meet the special needs of the patient's work. A railway mail clerk, after trial of other forms, chose one in which the intermediate strength came across the middle of each glass as a narrow rectangle, its long sides placed horizontally. Another patient has required that this intermediate zone be made quite as broad or broader than either of the other portions.

When the glass is composed of three separate pieces, cut out of different lenses, the centering can be easily arranged to produce the minimum of undesirable prismatic effect. The superimposed films, described in the above article, are also capable of such centering to a very large extent. Even with the invisible trifocals, which have been produced in excellent shape in at least three of our larger American cities, undesired prismatic effects can be managed about as well as in the popular invisible bifocals.

Using two transitions in the strength of the glass, instead of one, we need to make each of the intervals in strength only half as great. Or one can be made even less and the other slightly greater than half when that is desirable. Even with complete presbyopia, where the patient needs for reading 3 D. convex added to his distance correction, the use of the correction with plus 1.5 for intermediate will give a very useful field, nearly at arm's length, in which many necessary things can be done with distinct vision instead of the intermediate blur.

Then during the period when presbyopia is coming on, a period often lasting 12 to 15 years, the intermediate glass will long prevent any space of necessarily unfocussed images. Patients sometimes reach the age of 60 with a full diopter of accommodation. With the addition to their distance correction of 1. D. for intermediate and 2 D. for reading, they can continue to get perfect focussing from infinity to one-third of a metre. Some surgeons have found the third or intermediate field most useful in operating. For several years the writer secured it by an additional pair of "operating glasses," of carefully selected strength and placement, that gave a desirable intermediate field, and at the same time added to the reading portion of his ordinary lenses power that was especially desirable for the more delicate operations on the eyeball. E. J.

BOOK NOTICES.

Glaucome et Glaucomateux. Dr. Victor Morax, Ophtalmologiste de l'Hopital de Lariboisière. Octavo, 368 pages, with 1 colored plate and 114 figures in the text. Paper back. Paris, G. Doin, 1921.

Is there any disease affecting the eye in which it is more important to take careful account of the general physical condition and health of the patient than glaucoma? Probably the more we learn about ocular disease, the more widely will we perceive its relations to general conditions. But among conditions in which the general ocular condition, the whole physical makeup and temporary general state of the patient must be considered, glaucoma will always be one of the most important. It is a happy thought to emphasize this in the title of a book dealing with glaucoma, and therefore necessarily with the glaucomatous patient.

It is a book that gives a good general account of its subject up to this time. It was founded on a series of conferences given at the Lariboisière. The first chapter gives a definition, the etymology of the word glaucoma, and a history of our understanding of the condition. The definition makes it practically synonymous with ocular hypertension. The history refers chiefly to Brisseau, Saint-Yves, Arrachart and Desmarres, and prints of the last two of these writers are here reproduced.

Chapter II deals with ocular tension and the methods of examining it. There is a full account of the tonometer of Schioetz, both of the instrument and the theory on which it is based. But apparently the epidemic of modified tonometers, that has invaded English speaking countries, has not affected France.

Chapter III discusses the physiology and pathology of the ocular tension, including an account of the angle of the anterior chamber and the intraocular blood vessel systems. Then come two chapters on the symptomatology of glaucoma, including an interesting discussion of the colored rings seen around a light. There is a color plate representing such rings, based on an autochrome photograph of the rings produced by light passing thru a glass plate sprinkled evenly with powder of lycopodium. Here, too, we find an account of the clinical method of Bailliart for testing the blood pressure in the retinal vessels, by watching the changes produced by a known pressure made upon the eyeball. There is also a discussion of the glaucoma cup and the anatomy of the head of the optic nerve bearing on it.

With Chapter VI the clinical forms and types of glaucoma are taken up, beginning with acute glaucoma. Later chapters discuss subacute and chronic, infantile, traumatic, accompanying intraocular foreign bodies, and secondary glaucoma, with a chapter on that associated with lesions of the crystalline lens. In Chapter XI, on secondary glaucoma, is found a description and a figure of a modified base for the tonometer, designed to render possible the use of the instrument when ulceration or deformity of the cornea renders the ordinary form of base inapplicable.

Chapter XIII takes up the diagnosis and prognosis of glaucoma; and Chapter XIV the treatment. In Chapter XV are discussed the special therapeutic indications of certain clinical forms of glaucoma, and the last chapter is devoted to a discussion of the etiology of glaucoma, an extremely attractive topic with which must be linked up its prophylaxis.

This book by Morax, which constitutes the second volume of his "library of ophthalmology," is a clear, practical, rather concise, well written account of its subject; which is today occupying a very prominent place in current ophthalmic literature. It brings us in close touch with the work in this department, of the living French ophthalmologists, and it gives excellent accounts of the recent glaucoma operations of Lagrange, Holth and Elliot. To all ophthalmologists who can read, or wish to learn to read French, it can be most highly recommended. E. J.

Transactions of the Ophthalmological Society of the United Kingdom. Vol. 40, pp. 674. Illustrated. London, J. and A. Churchill.

The outstanding feature of this volume is the Decennial Index compiled by A. L. Clarke. This is a general index of all the contents of volumes 31 to 40, inclusive, of this series of transactions. It occupies 56 pages and no other equal number of pages add anything like an equal value to this series of volumes Here are over two thousand references, arranged alphabetically by well considered topics and by authors' names; which will in a minute or two reveal whatever has been published on any particular subject in these transactions in the last ten years. As literature accumulates the value of good indexes rises rapidly. This is most clearly illustrated in this instance.

The most striking characteristic of these transactions is the large number of separate, brief, practical communications which they contain. This volume contains over 100 separate papers, many of them accompanied by the condensed discussion of them by their hearers. This is to be contrasted with the number of papers found in the last volumes of other Ophthalmological Societies using the English language, 33 for the American Ophthalmological Society, 15 for the Section on Ophthalmology of the American Medical Association, and 21 for the American Academy of Ophthalmology and Oto-Laryngology. It is the great number of com-

munications thus made available that gives special value to this index.

The added strength brought by union is illustrated in this volume, for the majority of the papers published in it were presented in the affiliated societies. There come from the annual Congress of the Ophthalmological Society of the United Kingdom 38; from the Oxford Ophthalmological Congress 8; The Midland Ophthalmological Society 23; The North of England Ophthalmological Society 6; The Irish Ophthalmological Society 24; and the Ophthalmological Society of Egypt 4. The newest addition to this list of affiliated societies, the Scottish Ophthalmic Club is not represented in the volume. From these affiliated societies the papers seem to have been carefully selected and compare well with those from the older organization.

The address of the President deals with the ophthalmic education of medical students, urging the Society to press these reforms: Each candidate for the license to practice, to attend an ophthalmic clinic for three months, and a final examination by ophthalmic specialists. A discussion on diabetes in relation to diseases of the eye occupies 44 pages. The opening papers are by Sir Archibald E. Garrod and Mr. R. Foster Moore. A second discussion, which occupies 75 pages, upon the prevention and treatment of ophthalmia neonatorum, was opened by Dr. Gibbon Fitzgibbon of the Rotunda Hospital, Dublin, and Mr. M. S. Mayou of London. Another extensive paper is the Doyne Memorial Lecture, given at the Oxford Congress by F. Richardson Cross, 35 pages on the nerve paths and centers concerned with sight.

Of the 8 plates in this volume, none are printed in colors. This absence of color plates is notable in a volume of this series, where earlier volumes have contained some of the best printed anywhere. But color plates, like everything else connected with printing, have increased greatly in cost; and the money, that might have been spent on one or two of them, may well have been put into printing this larger volume. It is the largest volume of transactions this society has yet published; and in appearance and quality of paper and printing it conforms closely to its predecessors. E. J.

National Safety Code for the Protection of the Heads and Eyes of Industrial Workers. Bureau of Standards Handbook Series. 64pp. Illustrated, Washington D. C. Government Printing Office.

This is the second of a series of safety codes, the first, the National Electric Safety Code, having been published in 1916. It first presents the general requirements and a classification of occupations that require eye protection. Then follow detailed requirements for each group of occupations, operating rules, and tests to insure that the various protectors will accomplish their purpose.

The rules laid down occupy nearly half the pamphlet. The remainder is taken up with a discussion of them, intended to assist in understanding the reason for them, to interpret them, and making suggestions for their carrying out. The devices here dealt with include protectors placed between the worker and the source of danger; goggles worn before the eyes; face masks that protect eyes and face; helmets that protect the head and neck, and hoods that also include portions of the shoulders and exclude dust and flying particles.

One who has to deal with industrial injuries to the eyes cannot fail to gain a better understanding of the conditions under which they occur, and the practical measures for preventing them from a careful study of this code. Its preparations has been supervised by a large committee on which state industrial commissions, engineering organizations, insurance companies and manufacturing corporations, including three optical concerns, have been represented, but no oculists. Containing matter outside the usual discussions found in ophthalmic journals and text books, it will on that account prove more valuable to ophthalmologists consulted about such injuries.

E. J.

CORRESPONDENCE.

PSYCHONEUROTIC ASTHENOPIA.

To the Editor: Your editorial on asthenopia was read with great pleasure, and you will pardon my comments. Asthenopia is perhaps often a psychoneurotic condition in children, boys and girls at school and college and adults in various occupations.

As a fair example, I give the history of my two sons and a daughter. At school at home they complained of their eyes. Careful examination without and with homatropin showed normal vision. All would accept a +0.37 spher. or +0.25 90° cyl. I told them nothing was the matter, and later when sent away to advanced schools warned them to be tolerant of any fatigue symptoms. In spite of this all insisted, after complaining by letter, on being allowed to visit an oculist in a nearby city; the result was that all three were given either +.37⊂+0.25 90° or +.25 +.25/90 for near use.

The cost of the glasses, railroad, hotel expenses, etc., was about seventy-five dollars—the oculists kindly not charging for professional services. All three wore the glasses a few months and afterward they were lost or regarded as junk. These cases are typical of thousands I see. Is it not a waste of money to order lenses for them? Some years ago a boy, about fifteen at school here with the same history insisted he could not study. His father was told there was nothing the matter with his son's eyes and he was taken from school and made to work. Several years after, having made good at college, he thanked me for advising his father as I did. The number of asthenopic eyes is increasing amazingly. Very truly yours,

EDWARD F. PARKER,

Charleston, S. C.

ABSTRACTS

Brouwer, B. The Oculomotor Nucleus. Zeits. f. d. ges. Neurologie u Psychiat. Bd. 40.

Brouwer examined the brain of a woman who had shown during the later years of her life double-sided paralyses of ocular muscles, and slowly progressive optic nerve atrophy had appeared. The left trigeminus and facial nerves had shown symptoms of disease, and the knee-jerks and Achilles reflexes had disappeared. The section showed an aneurysm of the right internal carotid, which had pressed on the nerves of the ocular muscles behind the right orbit, had grown toward the left side and had pressed on the chiasma and the cerebral nerves of the other side. In the region of the oculomotor nucleus, the left large cell lateral nucleus was found intact, the right large cell lateral nucleus was much degenerated in its anterior part, diminution of cells was found in the front and middle third of the right lateral nucleus, the Perlia nucleus was partly degenerated, the Edinger-Westphal cell groups were normal. The left facial nerve was not changed, altho during life a facial paralysis had existed. The trigeminal nerve showed distinct changes.

Another case of double-sided ophthalmoplegia, caused thru a one-sided aneurysm confirmed anatomically does not exist in the literature. It is peculiar that the degeneration in the motor nuclei was so slight, and only found in the right nucleus. It is probable that the pressure on the right nucleus and root had been more intense and lasted longer. The section did not explain all clinical symptoms. The repeatedly found Babinski can be explained by pressure on the pons. Not explained are the facts that the reflexes in the lower extremities had disappeared, and that some disturbances of the sensibility in their upper parts were found. Probably changes in the lumbo-sacral region were present, perhaps also an

aneurysm, as one was found also in the corpus striatum.

Brouwer concludes, from the study of the literature and of comparative anatomic material, that his material gives a good basis for the opinion that the Edinger-Westphal cell group represents the sympathetic part of the oculomotor nucleus. He considers that the arguments against this Westphal theory are too highly estimated in the literature. Considering the different schemes which have been made to represent the position of the nucleus of the elevator of the upper lid, Brouwer agrees that this position is in the frontal part of the large cell oculomotorius nucleus of the same side. A clinically bilateral ptosis was present, which during the last part of life had been greater on the right side, anatomically a large disappearance of cells in the frontal pole of the right oculomotor nucleus and in the Perlia nucleus was found.

It is not so strange that the nucleus of origin of the levator should be in the frontal pole of the oculomotor nucleus, as many investigators have come to the conclusion that the nucleus of the superior rectus should be localized in the front part. From the reptiles on the levator appears, it receives its nerve from the branch of the oculomotor for the superior rectus. It can be considered to be split from the superior rectus, a phylogenetically younger part of it; and it is therefore very probable that its cells of origin are in near contact with those of the superior rectus.

Brouwer has examined a case which showed during life paresis of the internus and found a distinct loss of cells in the Perlia nucleus, which he considers to favor Knies' theory, that the convergence center is situated in this nucleus. Comparatively, he found that raphe cells appear in animals when the position of the eyes in the head makes convergence possible. These cells undergo a double change in anthropoid apes and man: they are much enlarged and they have extended more forward. The enlargement can be understood thru the higher significance of the convergence function. The movement forward can be explained thru neurobiotaxis. These cells move in the direction of the Edinger-Westphal nucleus, that is in the direction of those cells, which serve for accommodation and narrowing of the pupil with the convergence. The Perlia nucleus is therefore nothing else than the phylogenetically younger part of the true raphe cells.

As a scheme for the oculomotor nucleus, Brouwer likes the best that of Bernheimer, with the exception of the median nucleus, to which Brouwer wishes to relate the convergence function. The internus has then a different group of cells for action with the other internus, and one group for the other functions. The raphe cells are as large as the cells of the lateral nucleus. E. E. B.

Abadie, Ch. Forms and Treatment of Chorioretinitis. Ann. d'Ocul. v. 157, 1920, p. 321.

The forms due to exogenous infections have a tendency to get well, while those of endogenous origin recur more frequently and become graver. They appear chiefly in middle life. They are usually of syphilitic origin, hereditary or ancestral, affecting only the deeper membranes as a rule. The appearance of the fundus varies from small, numerous circumscribed foci to large white islands, sprinkled with numerous patches of pigment.

Sometimes the disease involves the optic nerve, causing atrophy. The appearance of the disc is characteristic. It is grayish, with ill-defined borders, and the arteries and veins are filiform, due to thickening of their walls. Chronic simple glaucoma and congenital hydrophthalmia are also complications or sequels. Detachment of the retina is a more frequent result, and even in myopia, foci of retinochoroiditis will be found in the equatorial region, which certainly play a role in this condition.

The treatment is intravenous injections of cyanid of mercury, 10 to 12 injections followed by a rest of 2 to 3 months; then a new series, rest, etc.

The results are very good, even in cases apparently hopeless, but the treatment must be carried on for a long time, even years. C. L.

E. Cecchetto. Treatment of Gonorrhoeal Conjunctivitis with Antigonococcic Vaccines. Arch. di Ottal. v. 27, 1920, p. 69.

Cecchetto reports his results in 59 cases treated from 1914 to 1919 by daily subcutaneous injections of vaccine. He had used instillations of antigonococcic serum, with good results, but found that its use alone would not produce prompt cures. With the vaccine alone, however, no local treatment being employed, he states that the majority of cases are cured in a few days, with no corneal complications.

He records only five corneal ulcers, of which four were developed when treatment began. One to seven injections produced a cure in most cases, but in a few ten to twenty were required. The accompanying vulvovaginitis or urethritis was also cured in most cases.

The best success was secured with Nicolle and Blaizot's vaccine.

S. R. G.

Bartels, M. Ocular Symptoms in Encephalitis Lethargica. Klin. M. f. Augenh. v. 65, 1920, p. 64.

Bartels found in his cases the following characteristic ocular symptoms: Ptosis, paralysis of accommodation, with pupils not correspondingly wide but partly impaired in their action, vertical paralysis of fixation, not horizontal. Occasionally there was nystagmus, impairment of vision, and in rare cases retrobulbar neuritis and sometimes exophthalmos. All were of favorable prognosis if the patient recovered. Bartels considers the disturbances as nuclear, arising thru the cerebrospinal fluid which penetrated into the surroundings of the Sylvian aqueduct, so that the superficial nuclei were damaged first. The earliest, most intense and most enduring phenomenon was the paralysis of accommodation. The 3rd, 6th and 7th nerves were most frequently affected; the 4th less frequently, and the 5th never.

For the differential diagnosis from cerebellar tumors, choked disc, preserved sensibility of the cornea and the sleepiness are of importance; from Wernicke's hemorrhagic polioencephalitis, the ptosis and sleepiness and in Wernicke's disease, the more total ophthalmoplegia; from epidermic tubercular meningitis, the wide pupils and iridoplegia and by lumbar puncture. In acute apoplexy due to arteriosclerosis; the apoplexy from the beginning, the simultaneous affection of the limbs and the further course, are determining. In patients with encephalitis lethargica, but presenting ocular symptoms, e. g., paralysis of accommodation and unilateral disturbances of pupillary reaction, the differential diagnosis from lues is very difficult. C. Z.

Simón de Guilleuma. Treatment of Localized Infections of the Lids with Ion Zinc. Revista Cubana de Oft. 1920, v.2., p. 234.

Simón has been able to cure very rapidly cases of lid abscesses and other localized palpebral infections, by the use of the ion-therapy with *ion-zinc*. The electrolite used is a solution of zinc sulphate one per cent strong, very pure.

The technic is as follows: after washing well the skin with alcohol, a piece of cotton with the warm solution is applied over the diseased region. On top is placed the electrode already prepared and covered with cotton, and all this is covered with a bandage. The electrode is then connected with the positive pole, while the negative pole is held by the patient in one hand. The current is put up to 2 or 3 m.a., during 30 or 60 minutes, according to the depth of the infection, and then the rheostat is retired with the same slowness as before. A very small number of sessions is usually needed. The skin over the region becomes red, and after some days there is some desquamation of the skin.

F. M. F.

Larsson, S. W. Acquired Atrophy of the Iris. Klin. M. f. Augenh., v. 64, 1920, p. 510, (ill.)

The left iris, of light yellowish brown color, of a woman, aged 47, showed on its temporal portion a large oval vertical opening, apparently the pupil. Its lower part extended to the limbus, where the iris was totally missing. Above this a small seam of iris formed the temporal border of the opening. The nasal portion of the iris, a crescent, was the best preserved part, forming as it seemed, the area of the sphincter, because it contracted upon light. It showed a slight eversion of the pigment layer. The remaining iris consisted of narrow strands which radiated from wider insertions to the above mentioned nasal crescent. The strands were composed partly of the dark brown pigment layer. Between the strands were complete defects thru which the illuminated fundus could be clearly seen. At the upper portion of the iris was a small coloboma. Excavation of the optic disc, tension 70. V., fingers at 2 m. The patient stated that she had not previously noticed such appearances of her eye.

A review of the literature shows a great diversity in the explanation of the cases similar to Larsson's case, but in all a more or less marked corectopia existed. Larsson assumes for his case a congenital anomaly, viz., a corectopia or an atypical coloboma with corectopia. In consequence of traction by the relatively well preserved sphincter, or by shrinking of the sphincter, interrupted in its continuity, an atrophy of the iris took place with subsequent defects. The perhaps congenitally weakened iris might be torn in the portion opposite to the corectopia most exposed to mechanical influences.

This mode of development would be analogous to the congenital defects of the iris. Why, in a number of cases, it occurred so late in life may have been due to the increased tension, since glaucoma may at an early stage cause atrophy of the iris. The pigment layer could be seen in a lower plane and its defects, in their direction and appearance, did not completely correspond with those of the anterior layer of the iris, from which it was separated by the hypertension of the iris; because on account of its content of elastic and stronger dilator fibres it resisted the tension. Larsson sees in this a further support of the mechanical etiology.

C. Z.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas,. Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu. Volunteers are needed in other localities.

DEATHS.

Dr. Heman H. Brown, a well-known ophthalmologist of Chicago, died April 10, at Orlando, Florida.

Dr. David Agnew Crawford, Guthrie Center, Iowa, died in Chicago, March 14, 1921, following an operation for carcinoma of the bowel.

Dr. J. Rohmer, Professor of Ophthalmology at the University of Nancy, died, February 11, at the age of 65 years. He felt severely the death of his two sons during military service in the late war, one by aviation accident the other by typhus. The latter, André Rohmer, had been chief of the Ophthalmic clinic at Nancy, had merited the war cross of the Legion of Honor, and died after the armistice while serving the repatriated prisoners.

PERSONALS.

Dr. G. P. Doyle has located in Berkeley, California.

Dr. John M. Wheeler announces the removal of his office to 30 West 59th Street, New York City.

Dr. Carl Fisher, formerly of Rochester, Minn., announces offices at 820 Baker-Detwiler Building, Los Angeles, California.

Dr. Herbert L. Gans, after active service in the war, has resumed practice limited to diseases of the eye, with offices at 220 State street, Albany, N. Y.

Dr. Melville Black of Denver has returned from a two months' vacation in Honolulu. He was delighted with the islands and made the acquaintance of a number of opthalmologists there who are on a par professionally with their confreres on mainland. He strongly recommends this trip to overworked ophthalmologists as a sure cure for all ailments resulting therefrom.

Dr. L. Koeppe, Privat Docent Ophthalmology, in Halle, has been asked by the medical faculty of the University, and by the Spanish Society for the Extension of Study in Madrid officially to give courses and lectures in the Spanish universities on "The Microscopy of the Living Eye," and to demonstrate the workings of the Gullstrand slit-lamp. Koeppe will spend two months in Spain.

Dr. Casey A. Wood's letter sent to a number of his friends shows how it is possible for him to retire from his profession and find mental and physical employment and pleasure. So many retired physicians are unhappy and their lives shortened because they find it impossible to occupy their time in a satisfactory manner. This is not true with Dr. Wood; he is busier than ever, and yet employed in such a way that his life will be lengthened. He is contributing to science findings that are of great value, and his example is worthy of emulation.

Dr. Harry Vanderbilt Wurdemann, Seattle, is in Washington and New York during the month of May. He gives a series of lectures at the Army Medical School, May 4 to 14, on "Injuries of the Eyes." May 11 he addresses the District of Columbia Society on "Bright's Disease and the Eye—the Relation of Ocular Lesions to Cardiorenal Diseases." May 16 he reads an essay before the Eye Section of the New York Academy of Medicine, on "Massage of the Eye for Relief of Iritic Adhesions, Optic Nerve Atrophy and Embolism of the Retinal Artery."

SOCIETIES.

The Chicago Policlinic has a class of seven physicians who are taking postgraduate work in ophthalmology, this month.

The Illinois Society for the Prevention of Blindness in one week recently, obtained convictions of two midwives for failing to report cases of ophthalmia neonatorum. One was fined $10.00 and costs, and the other one $50.00.

The monthly meeting of the Kansas City Eye, Ear, Nose and Throat Club was held on April 21st. Papers were read by Dr. J. G. Dorsey of Wichita, Dr. T. E. Wyatt of Kansas City, and Dr. E. M. Seydell of Wichita. Dr. W. G. Gillett, Wichita, presented a pathologic report on Dr. Dorsey's glioma cases.

At the regular meeting of the Chicago Ophthalmological Society, April 18th, in a symposium on "Uveitis," Dr. Nelson M. Black, of Milwaukee, discussed the "Etiology"; Dr. Sanford R. Gifford, of Omaha, the "Pathol-

ogy," Dr. W. H. Wilder, Chicago, "Symptomatology"; and Dr. J. Loring, Chicago, the "Treatment."

At the Annual Congress of the British Ophthalmological Society, held in May, there was a discussion on "The Psychology of Vision in Health and Disease." The Bowman Lecture was given by E. Treacher Collins, on "Changes in the Visual Organs Correlated with the Adoption of Aboreal Life and the Assumption of the Erect Posture."

On April 18th, the section of ophthalmology of the New York Academy of Medicine was addressed, by invitation, by Dr. Lee M. Francis of Buffalo on "Surgical Treatment of Epithelioma of the Cornea with Report of Three Cases," and by Dr. E. C. Ellett of Memphis on "Corneal Sutures in Cataract Extraction" and by Dr. Karl Lindner of Vienna on "A Few Facts Regarding Infection of the Conjunctiva."

At the meeting of the Section on Ophthalmology of the College of Physicians of Philadelphia, April 21st, 1921, papers were read by Dr. Robert Scott Lamb, of Washington, D. C., on "Retinal Detachment; Suggestions as to Its Treatment," by Dr. Warren S. Reese, "Report of Two Cases of Cavernous Sinus Thrombosis"; by Dr. T. B. Holloway, on "Additional Cases of Snowball Opacities of the Vitreous," and by Dr. Burton Chance on "The Status of Color Vision."

In urging as many British ophthalmologists as possible to be present at the International Congress of Ophthalmology to be held in Washington next year, the British Journal of Ophthalmology points out the difficulties we will have at this time in securing anything resembling an international representation at the Congress. The Journal adds this significant statement: "It is not needful to dilate on the hospitality which the inhabitants of the United States show to all their guests. What is of greater importance to us in this country to realize is the vast amount of good work that is being done in ophthalmology in America."

MISCELLANEOUS.

A bequest of $25,000 to the New York Eye and Ear Infirmary, by the will of Miss Elizabeth Southmayd, has recently been announced.

Dr. G. Oram Ring's obituary to his friend and preceptor, Dr. Samuel D. Risley, in the Bulletin of the A. M. P. O., is a scholarly tribute and will be much appreciated by all members of that order.

In the chemical laboratory of the University of Illinois a new local anesthetic has recently been produced, to which the name of Butyn has been given. It is a synthetic succinate, and from the reports of several ophthalmologists who have been giving it a trial for the past few weeks, it possesses certain marked advantages over cocain. While it is only one-half as toxic as cocain, its action is three or four times as rapid, and it has no effect upon the pupil nor the ciliary muscle.

With the aid of a gift from Dr. Adolph Barkan, emeritus professor of the Stanford Medical School, the University is gathering in the Lane Library of the medical school in San Francisco a collection on the history of medicine that will be equalled by no other Western institution. Dr. Barkan will give $1,000 a year for the next three years, to which the university will be able to add from the income from certain Lane Library foundations $1,500 a year, making a total fund of $7,500, all of which will be expended on books concerning the history of medicine. Dr. Barkan himself, is now in Europe and he has employed an expert and has also gained the assistance of one of the most celebrated professors in Europe to aid him in getting together this collection. Dr. Barkan was professor of structure and diseases of the eye, ear and larynx in the medical school, and retired from active teaching in 1911. He has before this been a liberal benefactor of the medical school library, having given his own library, dealing with the subjects in his own special field, together with $10,000 as a fund for the purchase of other books on these subjects. (Jour. of the A. M. A., April 23, 1921.)